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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No 48 SEPTEMBER 1841

I —*Description of some Molar Teeth from the Eocene Sand at Kyson in Suffolk, indicative of a new Species of* Hyracotherium (Hyr Cuniculus) By Richard Owen, Esq, F R S, &c

IN the Eocene sand underlying the red crag at Kingston or Kyson in Suffolk, from which the remains of *Quadrumana*, *Cheiroptera*, and *Marsupialia* have already been obtained*; Mr Colchester, the discoverer of those mammalian remains, has recently transmitted to me through my friend Mr Lyell a second collection of fossils, including the teeth of small mammalian animals, some of which are referable to the small Pachydermal extinct genus *Hyracotherium*, established on a nearly entire cranium obtained by Mr Richardson from the London clay near Herne Bay, in 1839†

The teeth from Kyson are three true molars, and one of the false molars, all belonging to the upper jaw The crowns of the true molars present the same shortness in vertical extent, the same inequilateral, four-sided, transverse section, and nearly the same structure, as in *Hyracotherium leporinum*, the grinding surface being raised into four obtuse pyramidal cusps, and surrounded by a well-developed ridge, produced at the anterior and outer angle of the crown into a fifth small cusp

These teeth are, however, of smaller size, as will be seen by the subjoined figures of a corresponding molar from the *Hyrac leporinum*, fig 1, and *Hyrac Cuniculus*, fig 2 The true molars of these two species further differ in a point not explicable on the supposition of their having belonged to a smaller individual or variety, for the ridge which passes transversely from the inner to the outer cusp is developed

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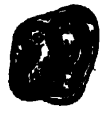

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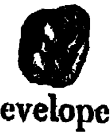

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* See Annals of Natural History, vol iv No 23, Nov 1839

† Geological Transactions, 2nd Series, vol vi p 203

midway into a small crateriform tubercle in the teeth of the *Hyracotherium leporinum*, but preserves its trenchant character in the *Hyrac Cuniculus*, even in molars which have the larger tubercles worn down

The premolar, or false molar, in the series of detached teeth from Kyson, which is either the third or fourth, presents the same complication of the crown which distinguishes the *Hyracotherium* from the *Chæropotamus*, but with the same minor modification which distinguishes the 3 true molars of the Kyson species from those of the *Hyrac leporinum* of Herne Bay, i e the two ridges which converge from the two outer tubercles towards 4 the internal tubercle are not developed midway into the small excavated tubercle, as in the *Hyrac leporinum*, fig 3, but are simple, as in fig 4

The disparity of size between the true and false molars appears to be greater in the *Hyrac Cuniculus* than in the *Hyrac leporinum* This discovery of a second species of the genus *Hyracotherium*, which, hitherto, has been found only in the London clay, tends to place beyond doubt the equivalency of the Kyson sand, underlying the red crag, with the Eocene deposits at the estuary of the Thames, and corroborates the inference deducible from the previously described mammalian, ornithic and ophidian remains of the London clay, that it was deposited in the near neighbourhood of dry land

I may add, that the collection of teeth and other small organic fragments from the Kyson clay, which included the molars of the small extinct Pachyderm above described, likewise included several vertebræ of a serpent, agreeing in every respect, save size, with those of the *Palæophis toliapicus*, recently described by me, from the Isle of Sheppey The Kyson serpent must have been about seven feet in length that of Sheppey exceeded ten feet, but I have lately had submitted to me for examination, by my friend Mr Dixon of Worthing, vertebræ of a distinct species of *Palæophis* from the Eocene clay at Bracklesham, corresponding in size with those of a Boa Constrictor of upwards of twenty feet in length

Fig 1 Grinding surface of the crown of the last true molar, right side, upper jaw, of *Hyracotherium leporinum*, from Herne Bay

Fig 2 Ditto, of the corresponding molar of the *Hyracotherium Cuniculus*, from Kyson

Fig 3 Grinding surface of the last false molar (the fourth counting backwards), left side, upper jaw, of *Hyracotherium leporinum*, from Herne Bay

Fig 4 Ditto, of the corresponding tooth of the *Hyracotherium Cuniculus*, from Kyson

Fig 5 Last true molar, left side, upper jaw, of *Hyracotherium Cuniculus*, from Kyson

II.—*Remarks on the Horny Sponges, with proposed divisions of the Order* Spongiæ. By JOHN HOGG, Esq., M.A., F.R.S., F.L.S., &c.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,

MR BOWERBANK having published some very interesting 'Observations on a Horny Sponge from Australia,' at p. 129 of the 'Ann. and Mag. of Nat. Hist.' for April 1841, I am induced to trouble you with a few remarks upon them.

The author there writes, "that, contrary to received opinions, they" (horny sponges) "are furnished with siliceous spicula." This opinion, however, which seems to me to have originated from Dr. Grant's examinations of some of our British horny sponges, and from the statement which he has made in the 'Edinburgh New Philosophical Journal' (for 1827, p. 122), where he says—"I have *never* observed any kind of spiculum in the horny species," is incorrect as far as it relates to *all* the *horny*, or subcorneous, sponges. Because, by referring to M. Lamarck's 'Hist. Nat. des Anim. sans Vertèb.,' tom. ii., edit. 1836, p. 538, it will be seen that M. Milne Edwards distinctly mentions some sponges which were described by M. Savigny and figured in the plates of his superb work on Egypt, as having "la disposition du réseau *corné* et des *spicules* qui constituent en quelque sorte la charpente de ces corps."

Now, since M. Milne Edwards has in the preceding page (537) expressly said that "on ne connaît pas d'espèces qui en présentent conjointement avec des épines calcaires et des fibres cornées," it is quite certain that the "réseau corné et des spicules" spoken of, and which were described by M. Savigny, must signify the skeleton of a *horny* net-work with siliceous spicula. Thus Mr Bowerbank, by his late investigations, has fortunately confirmed this fact, and has discovered the presence of siliceous spicula in some *other* species of the horny sponges, which species were previously supposed to be entirely destitute of them. But as it was likewise generally thought that the siliceous spicula seldom or never put on more than *two simple forms*, it is of importance to find from that author's paper that he has proved the siliceous spicula in the horny sponges which he examined to exist under *several different* forms, some of which he has represented in the accompanying figures, (Plate III. Vol. vii.)

The next objects worth especial notice in that paper are, first, the reticulations of the transparent membrane. These, indeed, strongly resemble those of the membrane of the *Spongilla fluviatilis*, which I have described at p 386 of the 'Linnæan Transactions,' vol xviii, and the second, the fixed sporidia,—the actual existence of these bodies in any of our British *sea* sponges I have never yet been able to witness, and which I account for from my not having examined them in their native localities at the proper season of the year Although previously figured in Donati's work and in the 'Zoologia Danica,' the fixed sporidia were first distinctly pointed out by Dr Ehrenberg, as having been seen by him in many sponges of the Red Sea

The reticulated transparent membrane and the fixed sporidia, then, fully confirm the general description of the *Spongiæ Marinæ* which I gave at p 400, 'Linn Trans,' vol xviii, in these words —"The sea sponges are furnished with a skeleton of fibres interlacing, crossing, and anastomosing with themselves, generally also strengthened with those singularly crystallized particles termed spicula, with a parenchymatous soft portion or jelly, with a fine and transparent enveloping membrane, with numerous minute pores, and frequently with larger orifices or oscules, which are more sparingly and irregularly dispersed over their surfaces, with passages or canals communicating through the pores and oscules one with another, along which the water finds a ready course or circulation, and affords nutriment to all the inner parts of the masses, with locomotive sporules, and in some species with fixed sporidia"

Mr Bowerbank has however omitted to say whether these sporidia were softish or hard, and whether the parenchymatous portion or jelly was composed of minute globules or not, nor has that author given us the names of the species which he has described Next, if we examine Mr Bowerbank's plate, we see the fixed sporidia well drawn at fig 8 in their natural position, but he has neglected to magnify any of them separately Fig 7 gives a representation of the *reticulated* transparent *membrane*, which, I believe, is quite new, and has never yet been figured in any engraving of the sponges

Again, Mr Bowerbank in the abstract of his paper, which was communicated to the Microscopic Society, and published in No 1 (for March last) of the 'Microscopic Journal,' mentions some of the horny sponges of commerce that were received from the Mediterranean, in which spicula were likewise discovered, but the *vascular tissue* surrounding the fibres there described, I am strongly inclined to agree with Dr George Johnston in thinking "as of no more than *specific* importance"

Also, it becomes me to correct the following passage from that Journal —"Dr Grant's observations were limited principally to the British species of sponge having siliceous or calcareous spicula, the true horny species not having up to that period been found on our coast Sowerby, in his 'British Miscellany,' has subsequently figured the *Spongia pulchella* obtained from the southern and western coasts of England" Now Dr Grant published his observations in the 'Edinburgh Philosophical Journal' for the years 1825, 1826, 1827, whereas Sowerby's 'British Miscellany,' vol i, was published long before—in fact, in the year 1806, in which volume, at p 87, Sowerby described the *S pulchella* as a new species, specimens of which had been sent to him by Mr Brown from Ireland about the year 1800, and by the Rev Hugh Davies from North Wales in 1802 I may here add, that I have found this beautiful species on the coast of Durham, where however it is rarely met with Having already observed upon the similarity of the *spicula* with *raphides**, I perfectly coincide with Prof Jones in accounting the crystalline needle-like particles which so abundantly occur in many sponges, as being analogous to and most resembling those crystalline secretions of plants, and I must confess that I do not see any facts detailed in the papers of Mr Bowerbank to lead me to alter my opinion respecting the *vegetable* nature of sponges

The objectionable word '*keratose*' has, I am glad to see, called forth a just remark from the Editor

I have been in the habit of using the word '*subcorneous*' in my own attempted arrangement of the *Spongiæ*, in which I have distributed many species without adopting the new generic names of *Calcispongia, Grantia, Halichondria, Halispongia, Tethya, Tethium*, part of *Alcyonium* of Lamarck, etc, since I thought it better to consider the whole under the new genus *Spongilla*, and the old genus *Spongia* of Linnæus and Montagu

The Order *Spongia* I some months ago separated for my own convenience into the following divisions —

Division I *Spongiæ Subcorneæ* The Subcorneous Sponges —Having fibres of a somewhat *horny* substance *without* any *spicula*
Example of a British species *S pulchella* (Sow)

Division II *S Subcorneo-siliceæ* The Subcorneo siliceous Sponges —Fibres composed of a somewhat *horny* substance with numerous *siliceous spicula*
No species hitherto discovered in Britain

Division III *S Subcartilagineo calcariæ* The Subcartilagino calca-

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* See Linn Trans, vol xviii p 398

reous Sponges —Fibres of a somewhat *cartilaginous* substance, with the *spicula calcareous*, or consisting of carbonate of lime
Examples *S compressa, S botryoides*, &c

Division IV *S Subcartilagineo-siliceæ* The Subcartilagino-siliceous Sponges —Fibres composed of a somewhat *cartilaginous* substance, with *siliceous spicula*
Examples *S tomentosa, S palmata*, and *Spongilla fluviatilis*

Division V *S Subereo-siliceæ* The Subereo-siliceous Sponges —Fibres of a *corky* substance, with long *siliceous spicula*
Examples *S verrucosa* (Mont) and *S pilosa* (Mont)

At present, as far as I am aware, no sponges have been discovered either with *horny* fibres and *calcareous* spicula, or with *corky* fibres and *calcareous* spicula The other parts of the sponges, such as the membrane and gelatinous portion, are of too fugacious a nature to afford any useful characters for the arranging of the Order, the *skeleton* itself, consisting of fibres as well as spicula (which exist in so many sponges), clearly offers the best characters for that purpose The preceding divisions I did in part derive from M Milne Edwards's observations in his edition of M de Lamarck's 'Hist Nat des Anim s Vert,' tom ii pp 535—541 And, inasmuch as no better arrangement of the *Spongiæ* has yet appeared, I am induced to think the preceding attempt may prove of use, and assist the observer in rendering perfect a general classification of them But this cannot be effectually accomplished until further investigations shall have been made on the *Sea Sponges* in their natural state, and for the purpose of urging those who have the opportunity to do so, I will here repeat the remarks which I have before made in a note at p 406, vol xviii of the 'Linn Trans' —"The difficulty of preserving sponges, even in bottles filled with rectified spirit of wine, is so great, that no one who has not the means of examining them in a fresh condition and in their native element, can ever expect to throw much light on their variously-formed structures The dried masses of fibrous skeletons, devoid of their true natural forms and colours, without their parenchymatous jelly and enveloping membrane, &c as exhibited in our museums, can but little assist us in obtaining a correct knowledge of their natural history"

I remain, Gentlemen, yours truly,
JOHN HOGG

London, May 1st, 1841

III —*Notes on the Zoology of the Outer Hebrides* By JOHN MACGILLIVRAY, Vice-President of the Cuvierian Nat Hist Society of Edinburgh

THE only account of the Natural History of the Outer Hebrides that has yet been published is that of Professor MacGillivray*, and it being now upwards of twenty years since that gentleman visited the district, I have been induced to arrange a few notes relative to the species observed during a residence there in the summer of 1840 Several additions to his list are here noticed, and a few errors corrected—errors which the state of British Zoology at the time he wrote rendered altogether unavoidable

Before proceeding further, it may be proper to mention that I was landed in Skye in the end of April 1840, was conveyed to North Uist, which I crossed, and established myself in Berneray, a small island in the sound of Harris From this central point, excursions, sometimes of several days' duration, were repeatedly made to all the neighbouring islands, to Harris, the southern portion of which was traversed in all directions, and to North Uist On the 29th of June I left for St Kilda†, and was absent eight days, on my return I set off for South Uist, traversing Benbecula, and remaining upwards of a week On my return I again visited Harris and the adjacent isles, spent some time in North Uist, and finally crossing to Skye in the end of August, walked through the west highlands to Edinburgh, which I reached after an absence of four months

MAMMALIA

The Otter, *Lutra vulgaris*, is sparingly distributed along the whole of the rocky coasts of the Hebrides It is found chiefly among the loose blocks of stone by the shore, but occasionally frequents the inland lakes, especially in South Uist The otters of the Hebrides belong exclusively to the dark variety, considered by Mr Ogilby as specifically distinct, which, though said to be smaller than the other, is yet not always so, for one shot in the island of Vallay measured five feet, and another seen at Scolpig about nine inches less, being still above the average size *Phoca vitulina*, Common Seal, is extremely abundant in the sound of Harris and the neighbouring inlets of North Uist, but less so elsewhere The young are born about the beginning of June, and immediately follow their mother One only is usually produced at a birth, but in a single instance two cubs were observed following one female During a storm I have seen them throwing themselves forwards, half out of the water, which movement they repeated several times in succession Two individuals of *Phoca grœnlandica,* Harp or Greenland Seal, were observed by Mr D MacLellan and myself, on a small rock in the Atlantic, off the west coast of South Uist, in the month of July They were seen through a telescope, at a distance of not more than 300 yards, as we were watching the strange movements of a large schooner which sunk in deep water a few minutes afterwards Being then in the habit of daily seeing numbers of seals, I could scarcely have mistaken so marked a species for either of the two others *Halichœrus griseus,* Nilss , Great Seal, as determined by me from the examination of several individuals, also of two crania, and numerous skins, is equally plentiful with the Common Seal, from which it differs greatly in habits It seldom enters the shallow sounds like the *Ph vitulina,* with which it never associates, but frequents the open sea, upon the western or Atlantic coasts of the islands, where alone I have observed it It breeds in November, leaving its young one upon the rock, and suckling it at each tide The most noted places of resort of this species are the rocky islands of Haskir, twelve miles off the west coast of North Uist, and Gaskir, at a similar distance from the Harris coast In the beginning of November a large boat filled with men leaves North Uist under night, and generally arrives at Haskir soon after daybreak The men land upon the island armed with long clubs and separate into two bodies, one of which attack the seals upon the shelving rocks upon which they are found lying with their cubs, while the other cut off their retreat to the water A short but fierce struggle then takes place, a few of the animals escape, the rest are killed by repeated blows about the root of the nose, their only vulnerable spot, and the rock is soon covered with the dying and the dead About seventy are thus annually procured, but the number varies considerably, as many as 120 having sometimes been obtained Many of them are of large size, one which I measured at Vallay being 7½ feet in length, exclusive of the head, and individuals of much larger size are not unfrequently met with

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* Edinb Journ of Nat and Geograph Science, vol ii pp 161 and 321

† An account of which will appear in the October Number of the 'Edinb New Philos Journal'

Mus Musculus, Common Mouse, is of common occurrence *M decumanus,* the Brown Rat, was observed to feed on shellfish and crustacea in the uninhabited islands of the sound of Harris, the sea-banks of many of which I have seen perforated in all directions with their burrows

Lepus Cuniculus, the Rabbit, has been introduced into South Uist and Barray, where it has multiplied prodigiously

The Red Deer, *Cervus Elaphus*, of the Outer Hebrides is much smaller than individuals from the mainland of Scotland By being carefully preserved, the deer are still plentiful in the forest of Harris and the interior of North Uist, in the latter situation they betake themselves to the water on being pursued, and easily find shelter among the numerous islets of the lakes

Various Cetacea were occasionally seen during my numerous boating excursions, both in the Minch and upon the west coast, but the only species, besides the Porpoise, *Delphinus Phocæna*, that I could identify is the Grampus, *D Orca*, conspicuous by its peculiar dorsal fin On the beach at Pabbay may be seen numerous gigantic bones, the remains of a drove of eighty grampuses which were driven ashore by the islanders about twenty-five years ago

BIRDS

The two species of Eagles, *Aquila Chrysaetos* and *Haliaetus albicilla*, were occasionally observed, the latter by far the most frequently As the eyries are well known in their respective neighbourhoods, and a reward offered for the destruction of both old and young, the number of these birds is annually diminishing The Sea Eagle, though usually building upon the maritime cliffs in one instance was found breeding on a small flat islet in one of the numerous lakes of North Uist, and two eggs were procured from the locality in question When sitting on the grass upon the summit of Ben Mhore in South Uist, a magnificent bird of this species alighted on a neighbouring pinnacle, which I had previously observed to be strewed with its down and feathers I crawled to within a few yards of the spot, and with a telescope leisurely examined the noble bird, as he stood erect and almost motionless, occasionally casting quick glances all around, on being disturbed he quickly unfolded his broad wings, launched into the mist below, and was soon lost to view It being a Sunday I had no gun with me, else I could easily have procured him, but the fine sight made ample amends for my disappointment The only breeding-place of the Golden Eagle visited by me, was an isolated promontory stretching far into the Atlantic, and forming the hill of Northtown Before reaching the spot I had unfortunately scared away the eagles by firing at some cormorants upon the rocks, and had to content myself with a distant view An uncle of mine, who for a long time resided in the neighbourhood, was in the habit of occasionally descending into their eyrie by means of a rope, and in this way took many eggs and destroyed several young birds One of the old birds was also shot by my father from a covered pit in which he lay concealed, the bird being enticed by a hen fastened by a string at a little distance

Falco peregrinus, the Peregrine Falcon, breeds in St Kilda, and I believe in various other localities, and was occasionally observed in several of the islands In the end of July, while crossing the moors of North Uist on horseback along with three companions, a male Peregrine flew past us with a *Lestris Richardsonii* in its talons, and another, probably the mate of the murdered bird, in hot pursuit, uttering incessant cries A splendid specimen of the Jer Falcon, *F islandicus,* was shot in North Uist a few years ago by my friend D Arbuckle, Esq, and another was seen in the adjacent island of Pabbay by Mr Nicholson (Berneray), but was not procured *F Tinnunculus,* Kestril, occurred not unfrequently, *F Æsalon,* the Merlin, once or twice, and the Hen Harrier, *Circus cyaneus,* was rather abundant, especially among the bogs of the two Uists, where it breeds

Hirundo rustica is the only species of Swallow that I met with in the Hebrides, where it did not arrive till the end of June About a dozen were observed at the landing-place of Pabbay on the morning of my departure for St Kilda, and a single individual had been caught alive in the school-house of Berneray and brought to me a few days before That rare bird the Hoopoe, *Upupa Epops,* extends its occasional visits to the Hebrides, for I was informed by my friend Dr M'Leod of a bird previously unknown in that part of the country, which, from description, was immediately recognised as the species now mentioned An individual was found in an exhausted state lying by the road side near Balelone in North Uist, after a long-continued easterly gale, and died shortly afterwards

The Wren, *Troglodytes europæus,* is pretty common, the Robin, *Erythacus Rubecula,* and Hedge Chanter, *Accentor modularis,* occurred only in the glen of Rhodil, where alone, in all the Outer Hebrides, is there wood in any quantity Of *Saxicola Rubetra,* Whinchat, a solitary pair was observed at Ob in Harris, where the nest was found, *S Œnanthe,* the Wheatear, arrived in the beginning of May (in Skye about the end of April), and soon became very abundant throughout the range I have sometimes found as many as three or four nests in the walls of a single hut A nest of the Redwing, *Turdus iliacus,* was found by Mr Bullock many years ago in the glen of Rhodil, but although I visited the spot repeatedly, I failed in again meeting with the bird The Song Thrush, *T musicus,* is plentiful everywhere, and identical with specimens from the south, although eggs brought by me from Harris are certainly smaller and darker than usual, and the nest is different The Common and Shore Pipits, *Anthus pratensis* and *aquaticus*, are both common, the nest of the latter I have frequently found at a distance from the sea

The Raven, *Corvus Corax*, is generally distributed, but is nowhere numerous, unless when attracted by a stranded whale or drove of grampuses Although it generally builds in lofty rocks overhanging the sea, from which I have taken the young, yet I know of a nest in the island of Berneray at an elevation of certainly not more than fifteen feet, but still quite inaccessible from above, and nearly so from below The owners of this nest made great havoc among the poultry in the neighbourhood, and I have known one of them to kill a full-grown duck and partially devour it *C Cornix* was the only other species noticed, though both *C Corone* and *C frugilegus* are met with in Skye The Hooded Crow is very plentiful, especially in St Kilda, and, like the Raven, approaches the huts early in the morning, searching the dunghills for offal of every kind It lives chiefly on shell-fish and crustacea, but when in South Uist in the end of July, I daily observed large flocks of this bird feeding on the larvæ bred in the putrid sea-weed collected into small heaps for manure In the Hebrides it breeds in rocks, chiefly maritime, but in the neighbouring island of Skye, I have taken the nest in a tree by the road-side, at the head of Loch Snizort The Starling, *Sturnus vulgaris*, is very common, beginning to collect into large flocks in July, and remaining thus till the end of April

Fringilla domestica, the Common Sparrow, I found in only a single locality—among the ruins of Ormaclate Castle in South Uist, of old the family-seat of Clanranald, *F cœlebs*, the Chaffinch, occurred only in the glen of Rhodil, along with *Coccothraustes Chloris*, the Greenfinch *Linota Montium*, the Twite, is abundant, and the only Hebridian species of the genus *Emberiza Miliaria*, the Corn Bunting, is plentifully distributed over the whole range, *E Schœniclus*, Reed Bunting, is rare, and *E Citrinella*, Yellow Bunting, was seen only at Rhodil *Plectrophanes nivalis*, Snow Bunting, I found so late as the middle of May, when I shot a pair on the sand-hill of Berneray The Skylark, *Alauda arvensis*, is common

Cuculus canorus, the Cuckoo, was seen and heard occasionally, especially in North Uist, about Loch Maddy and elsewhere The Rock Dove, *Columba Livia*, breeds in great numbers in the maritime caves and fissures, and nowhere more abundantly than in the island of Pabbay During summer its food consists almost entirely of *Helix ericetorum* and

Bulimus acutus, shells very abundant among the sandy pastures

The Red Grouse, *Lagopus scotticus*, is abundant, and the Ptarmigan, *L cinereus*, occurs sparingly upon Ben Mhore and Hecla in South Uist, and Ronaval in Harris, but more plentifully upon the summits of the Forest Hills A single individual was seen in St Kilda a few winters ago by the minister, who informed me of the circumstance, which seems almost incredible, the nearest land being fifty miles distant, from which it looks a mere speck upon the ocean Yet birds apparently less capable of enduring continued flight, as the Corncrake and Wheatear, annually visit St Kilda

Charadrius Hiaticula, the Ringed Plover, is very plentiful, as is also *C pluvialis*, Golden Plover, the latter congregates into vast flocks about the end of July, which betake themselves to the shore at low water, and I have seen the "ebb" of Berneray, a curious reef of bare stones extending upwards of a mile, in many places completely covered with their dense masses *Vanellus cristatus*, the Lapwing, is very abundant in several of the islands, as Ensay, Killigray, and Toroway, as well as the two Uists and Benbecula The Oyster Catcher, *Hæmatopus ostralequs*, is plentifully distributed, breeding in almost every maritime situation, as well as by the inland lakes, the nest varies considerably, according to the locality It is extremely probable that the Turnstone, *Strepsilas collaris*, breeds in the Hebrides, at least occasionally, for I have seen it in pairs so late as the middle of June in the island of Ensay, and shot it in the end of July and beginning of August upon the reef of Berneray *Numenius arquata*, the Curlew, is common, but I did not find it breeding, *N Phæopus*, the Whimbrel, was first seen on the 2nd of May, and had disappeared by the end of the month, hence the vernacular name of May-fowl It is very plentiful, and usually met with in small flocks of about twenty or so, and on its arrival is very tame, but soon becomes more wary It chiefly frequents the pastures, but occasionally resorts to the shore at low water, none remain to breed, for I never heard of any being seen after the end of May *Tringa variabilis*, the Dunlin, is very common, leaving the coast for the heaths in May, and returning in the end of July along with the young of the year The Sanderling, *Calidris arenaria*, I have observed so late as the middle of May, hence it may possibly breed in some part of the district *Totanus hypoleucos*, Common Sandpiper, occurs by the margins of most of the lakes, where it breeds *T Calidris*, the Redshanks, was shot in Berneray in the end of May, and found in pairs on the island of Toroway in June, and at Vallay in August, but was not observed elsewhere, nor was the nest found When crossing the sand fords between South Uist and Benbecula in the end of July along with Mr D MacGillivray, we fell in with a large flock and several smaller ones of *Limosa rufa**, Bar-tailed Godwit, which allowed us to ride up sufficiently close to enable me to identify the species, they were probably on their way southward, after breeding in high northern latitudes *Scolopax Gallinago,* the Common Snipe, is abundant in all the bogs, *Rallus aquaticus,* the Water Rail, occurred in North and South Uist, *Crex pratensis,* the Land Rail, was plentiful during the summer, frequenting at first the dense patches of *Iris Pseudacorus* in the marshy grounds, and resorting to the corn when that is tall enough to afford shelter *Gallinula chloropus* and *Fulica atra,* the Water Hen and Coot, are both pretty common in such of the lakes as have the margin furnished with aquatic plants *Lobipes hyperboreus,* the Red-necked Phalarope, occurs in small numbers about Scolpig in North Uist, and in the adjacent island of Vallay In the latter situation it may usually be found about the drains and ditches in the neighbourhood of the Manse, where it was first observed by Mr D Macrae

Anser brachyrhynchus, the Pink-footed or Short-billed Goose, breeds in great numbers in the small islands of the sound of Harris, as well as those of the interior of North Uist This bird was seen in flocks so late as the beginning of May, was observed in pairs among the islands in the sound about the middle of the month, and had the young fully fledged and strong upon wing about the end of July, it had again collected into flocks by the beginning of August, for late in the night of the 8th of that month, as I was riding in great haste to overtake the ferry-boat for Berneray, while crossing the sandy margin of a shallow pool, I came suddenly upon a flock of geese amounting to several hundreds, judging from their cries, which startled my horse, and I may add, myself also A large flock of Brent Geese, *Bernicla Brenta,* passed over head from the southward on the 2nd of May, while I was engaged collecting crustacea on the reef at Berneray this is the latest date of their occurrence, for I could never hear of any remaining to breed *Tadorna Vulpanser,* the Shieldrake, breeds in all the islands of the sound of Harris, with the exception of Berneray, Pabbay, and Shellay, and is plentiful in many parts of Benbecula and the two Uists The eggs at first have a slight tinge of pink, which they soon loose *Anas*

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* The supposed species *L Meyeri,* Leis, is plentiful along the Frith of Forth in many places, I shot several specimens last autumn at Musselburgh

Boschus, Mallard, is not uncommon, and the Teal, *Querquedula Crecca*, has been known to breed in South Uist, but I never observed it there The Eider Duck, *Somateria mollissima*, breeds in small numbers on some of the less frequented islets of the sound of Harris, as Skerry-vore, Shellay, and those between Killigray and Ob The island of Haskir is the chief breeding-place of this bird, the numbers there found being represented as truly astonishing *Harelda glacialis*, the Long-tailed Duck, was observed in pairs in the sound of Harris so late as the beginning of May, but none remained during the summer

The Goosander, *Mergus Castor*, is pretty common, breeding by the larger lakes and occasionally by the sea, as near Loch Maddy in North Uist *M Serrator*, the Red-breasted Merganser, I have seldom observed inland, like the preceding, a few remain during the summer, and I took the nest with eggs on a small island between Killigray and Ob, in the sound of Harris The Cormorant, *Phalacrocorax carbo*, is rather plentiful, breeding along with the next in St Kilda, Shellay, and Towhead *P cristatus*, the Shag, is much more plentiful than the last, and may be found in most of the maritime caves, where it is so tame that I have several times seen them killed with stones thrown from above Among many which I shot at Northtown, beside a cave which in days of old sheltered for a time one of the fugitives from Culloden, Mr M'Leod of Berneray has one of a light brown colour this being in the month of June, it could not be one of the young birds of the year, which are well known to have their first plumage of that colour The Gannet, *Sula Bassana*, may be seen coasting along the headlands and entering the bays with the first dawn of morning, and retiring in the evening in long strings towards St Kilda, where alone it breeds When gorged with fish it is sometimes scarcely able to raise itself from the water, and I have seen it taken by the hand when asleep in this state The Common Tern, *Sterna Hirundo*, was first observed on the 14th of May, and found breeding a few days after in company with the Arctic Tern, *St arctica*, which is much more plentiful On several of the smaller and less frequented islands on which I landed, many hundreds of their eggs were taken in a few minutes, and in some places one could hardly move without treading upon them, a loose cloud of terns of both species hovering about uttering incessant cries, and darting down to within a few feet of the invaders of their peaceful territory The Laughing Gull, *Xema ridibundum*, is abundant in the marshes of the two Uists and Benbecula, also near Rhodil and in Berneray, breeding in all these situations *Rissa tridactyla*, the Kittiwake, breeds only in Haskir and St Kilda, in the latter place in large colonies *Larus marinus*, the Great Black-backed Gull, is plentiful, its nest was found only on the small island of Shellay, at Lowhead, and in the interior of North Uist, among the small lakes *L fuscus*, the Lesser Black-backed Gull, is not so common as the others of the genus, but was found breeding in the same places as the preceding Large colonies were noticed on several of the islets of North Uist, upwards of a mile from the sea *L canus* and *L argentatus*, the Common and Herring Gulls, were equally abundant, the latter was never found breeding in the interior as the former occasionally was *Lestris Richardsonii*, Richardson's Skua, breeds in several spots in the interior of North Uist and a few stragglers might now and then be observed upon the coasts, chacing the terns and smaller gulls The Fulmar, *Procellaria glacialis*, breeds in astonishing numbers upon the terrific cliffs of St Kilda, but was not observed elsewhere, except when at sea in very gloomy weather, also in the evening and at daybreak, when I have seen them following in the wake of the boat, but seldom for any time In St Kilda I have taken them alive upon the rocks, but never observed them eject oil from their nostrils, as mentioned in ornithological works, though they *vomit* that fluid most copiously on being wounded or roughly handled Such as I dissected had the stomach filled with clear oil, mixed with the horny mandibles of some *Sepiadæ*, on which, and not the "flesh of whales," as stated in books, the St Kilda Fulmar may be presumed to subsist *Puffinus Anglorum*, the Shearwater, was seen occasionally at sea, but on land only in St Kilda, where it nestles in excavations formed by itself like the next, it seems to be in great measure a nocturnal bird The Stormy Petrel is extremely plentiful about St Kilda, whence it issues about an hour before sunset as to the species I am not quite certain, as I did not procure a single specimen, for although they sometimes came about the boat in great numbers, this happened only in very rough weather, when, as every one who has faced the Atlantic in an open boat during a heavy gale will readily imagine, shooting was rendered exceedingly difficult, and picking up the dead birds next to impossible

The Dobchick, *Podiceps minor*, occurred in almost all the lakes of North and South Uist The Eared Grebe, *P auritus*, in the latter only, chiefly about Ormaclate The Northern Diver, *Colymbus glacialis*, was plentiful until the beginning of June, when they all disappeared, and had not again returned when I left the country *C septentrionalis*, the Red-throated Diver, was observed on several of the lakes, and *C* *arcticus*, Black-throated Diver, was ascertained to breed in North Uist I did not however find the nest of the latter bird, but mention the fact upon the authority of several of my friends who did so and know the species well—among others, Lieut Macdonald of North Uist The Guillemot, *Uria Troile*, was observed with the Razor-bill in vast numbers in the end of April, while crossing the Minch in the Uist packet, and that too during the whole extent, or about thirty miles *Uria Grylle*, Black Guillemot, was found on all the rocky coasts, but was nowhere very numerous The first young bird fully fledged was shot on the 14th of August Of the Puffin, *Mormon arcticus*, I saw countless myriads in St Kilda*, where they far outnumber all the other species *Alca Torda*, the Razor-bill, is also very plentiful in St Kilda, and, with the Puffin, breeds also in Haskir, but in far smaller numbers When in St Kilda I was told by some of the fowlers, that the Great Auk, *Alca impennis*, is still seen occasionally, but that none had been procured for many years back

IV —*Researches on the Structure of Annular Vessels*

By Hugo Mohl†

[With a Plate]

Dr Schleiden lately published some observations on the spiral formations in the cells of plants in the 'Flora' (see Annals and Mag of Nat Hist, vol vi p 35), which interested me the more by reason of my having recently directed attention to the same subject (Flora, 1839, pp 81–142), and especially as the result of his researches coincided with my own in all essential points concerning the structure of the cellular membrane of vegetables His opinion principally differs from mine in two points, viz the order of development of the secondary membranes and fibres in the woody fibre of *Taxus* and allied organisms, and the formation of the annular vessels

I must wait for a more favourable opportunity to examine the first point, but, as regards the second, I will state the reasons which induce me to adhere to my former opinion, notwithstanding Schleiden has set forth a new theory respecting the development of the annular vessels

Long ago (see 'Flora,' 1838, p 378,) have I been opposed to the hypothesis, which is devoid of all foundation, although generally received even in the present day, that annular vessels owe their origin to the disruption of the spiral fibres of spiral vessels whose fragments become afterwards united in the form of rings. On the contrary, I have explained the formation of annular fibres as a mere modification of spiral fibres, founded upon the fact, that the ascension of a spiral fibre, which can, on the one hand, be extended so far as to take a longitudinal direction, may, on the other hand, be diminished to such a degree that its direction may transversely cross the longitudinal axis of the vessel, the consequence of which must necessarily be, rings returning into themselves instead of spiral fibres. On the contrary, Dr. Schleiden thinks that, in the secondary membranes of the utricles of plants, we can, without any exception, demonstrate a spiral disposition of the fibres, and that annular vessels are formed by spiral vessels which have a constant tendency to unroll themselves, the coils of whose fibre become united here and there by two and two, so as to form perfect rings, which subsequently become isolated by the absorption of the interposed portion of the fibres. This development, he assures us, may be observed in an examination of the annular vessels in their earliest stage.

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* Where I procured a nearly white variety of this species

† From the Flora, 1839, p 673

The solution of the question as to which of these two theories is the true one, will appear to many, in general, more simple and easy than it really is. It might be supposed that by means of a good microscope, used with the necessary skill and patience, the difficulties of research arising from the minuteness and softness of the vessels in their primary development would be easily surmounted. Such is in fact the case, though, nevertheless, this is not sufficient to place the matter in a clear light, for the principal difficulty in researches on the development of a vegetable organ arises, in the present as well as in most other cases, from the organ whose development is to be studied not presenting the same structure under all circumstances, but, on the contrary, presenting in the different cases subjected to examination greater or less deviations from the normal type. It is this circumstance which frequently hinders us from deciding whether we have a normal development before us, or only an accidental though persistent deviation. The observer, not seeing the successive development of an organ effected before his eyes, but having to establish his opinion on isolated facts observed at different stages of development, is often induced to consider some accidental and unimportant circumstance of greater interest than it really is, and thus founds upon these exceptions, although accurately observed, a theory entirely false. Only by researches frequently repeated can such errors be avoided.

Before passing to the examination of annular vessels, I shall offer some remarks on the fibre of spiral vessels.

Whoever has examined the development of spiral vessels and spiral cellules, and recognised their constant analogy with each other and with the dotted cellules, will not doubt for an instant that he sees in the fibre of spiral vessels, not a particular and independent organism, but rather the secondary membrane of the vascular utricles, divided in a spiral direction into one or more parallel bands As regards the organization of this pretended fibre, I refer therefore to my work on the organization of the cellular membrane, because all that can be said on the structure of the membrane of the spiral cellule is equally applicable to the wall of the spiral vessel But as respects what I have to say concerning annular vessels, it is necessary to examine with care some points relative to the spiral fibre

In the memoir above quoted I have detailed their striæ, their great facility of tearing in a spiral direction, the hollows and furrows lying in a similar direction, and more especially the slits, which entirely penetrate the thickness of the cellular membrane, as the reasons which favour the opinion that the secondary cellular membranes possess a fibrous structure All these phænomena, which are so frequently seen on the parts of the cellular membrane situated between the dottings on the cells, are also observable on the fibres of the unrollable spiral vessels, but are not so often recognised in the latter, either on account of the narrowness of the spiral fibre, or that frequently, even under the highest magnifying powers, the spiral fibre appears homogeneous When, on the contrary, the fibre is of a considerable width, so that it rather resembles a flattened ribbon than a semi-rounded or quadrangular thread, it does not, in most instances, present a homogeneous aspect, but furrows more or less deep are observable in it in the direction of the fibre, either in one row or side by side, and in this last case they give to it a retiform appearance (Plate I fig 2 and 3, *Commelina tuberosa*) In other cases these furrows penetrate through the entire thickness of the fibre, which, at different points, is divided into two or more fibres placed side by side These fibres either take a parallel direction, or the detached fibre at a greater or less distance reunites with the other, or else one of the fibres arising from division, leaving the other part, which continues in its primary direction, rises in a more oblique spiral direction, until it reaches the adjacent coil of the fibre into which it merges Thus, in short, we observe, that almost all the modifications of form found in the secondary utricular layers result from the close union of all the constituent parts of the fibre, from their more or less decided separation into isolated threads, from deviations in the course of these from that of the main-thread, or from a reticulated union of the isolated threads

The direction in which the spiral fibre is wound has, indeed, no direct connexion with the organization of the vessel, nevertheless I think it necessary to make some remarks on this subject, because several erroneous statements, partly founded upon an imperfect knowledge of the spiral, have been advanced by some authors I have elsewhere said that the great majority of spiral vessels were wound to the right, that is, the volution of the fibre is such, that, to an observer placed in the axis of the cylinder around which the spiral line rises, the fibre appears to mount from left to right, as shown in the vessel represented at figure 5 Like most other phytotomists, Schleiden says that the spiral fibre is wound sometimes to the right, sometimes to the left, and he thinks it possible to admit provisionally, as a general rule, that in spiral organizations "contemporaneously" developed, those which are situated immediately side by side in the direction of the radius have similar directions (*homodromes*), whilst those placed side by side in directions parallel to the periphery have different directions (*heterodromes*), and in proof of this law he relies on the constant crossing of the pore-like fissures in contiguous parenchymatous and ligneous cellules when observed in sections made parallel to the medullary rays I must confess my inability to conceive how Dr Schleiden can allege the crossing of the porous fissures in support of the volution of the fibres in different directions, since it proves quite the contrary This crossing is seen when two vessels or cellules furnished with pores are superposed, and the adjacent parietes wound in opposite directions, but it is evident that this last case is only possible when the winding in the two vessels is homodromous * It is quite true that we generally see the porous fissures crossing each other in a section parallel with the medullary rays, which proves that the different layers of cells visible in such a section and placed one under the other, are wound in a homodromous direction, but as at the same time the cells of every such layer are homodromous with each other, it clearly follows that, generally speaking, all the cells of a plant are homodromous, and this, in fact, will be found to be so on an examination of different sections of the same plant

Without doubt spiral vessels exist which are wound to the left, but although I have latterly found them more frequently than formerly, I must still persist in asserting them to be much rarer than those wound to the right, and that they should rather be considered as exceptions to the rule, since, in most plants, we find a hundred spiral vessels wound to the right for a single one wound to the left Doubtless it is true that these proportions vary in different plants, and I cannot yet say whether the finding in them more frequently spiral vessels wound to the left be a fact peculiar to certain species or only to certain individuals generally they are, as I have said, wound to the right The volution to the right or to the left, in spiral vessels, is quite independent of the organization of the surrounding parts, as is proved by the fact that, in certain cases, not only the fibres of two superposed utricles of the same vessel are wound in opposite directions, but sometimes even in the same vascular utricle (as I have seen in the Gourd) the parts of the spiral fibre separated from each other by rings are wound in an opposite direction (Plate I fig 9)

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* [This illustration may be easily verified by applying two quills together, with equidistant homodromous or heterodromous spirals scratched upon them —Ed]

When we examine the fibre of the perfectly developed annular vessel (for which researches I have been accustomed to use the *Commelina tuberosa*), we find its organization perfectly analogous to that of the spiral fibre, in the rings being composed sometimes of an apparently homogeneous substance, and sometimes exhibiting traces of a determinate structure

In the broad fibres, as in the *Commelina tuberosa*, the fibre frequently exhibits a great number of shallow linear furrows or perfect fissures, forming a net-work of very narrow and elongated meshes (fig 1, 3) More frequently still these fissures are found in an uninterrupted line in the medial line of the fibre, or they become confluent, and thus divide the ring into two superposed rings (fig 4 *a, a, Commelina tuberosa*) When this latter division takes place, it generally recurs on every ring of a vessel Frequently, however, this does not occur, but divided and undivided rings alternate in an irregular manner, the undivided rings being sometimes of equal size, sometimes of half the size of the divided rings, and sometimes of a size very inconsiderable in comparison with the divided rings (Plate I fig 1, *Commelina tuberosa*)

The direction of this line of division is parallel to the lateral edges of the ring, so that, by this fissure, the ring is divided into two superposed rings, which sometimes touch and sometimes are placed at a little distance from each other According to Schleiden, this line of division proceeds from the coils of the spiral fibre being more or less completely soldered together, and always in pairs We easily perceive that, in this case, the line of partition should be directed spirally from one edge of the ring towards the other, and that it should not be parallel to its edges, but as the latter is constantly the case, we must reject this explanation of the origin of the line of partition

In the developed annular vessel, the rings are either entirely isolated, or two or three are joined together in different ways It not unfrequently happens that the line of partition does not divide the ring throughout the whole of its circumference, but that the two superposed rings are united for a space variable in extent, in which case the parts separated are removed to a greater or less distance from each other, and are placed obliquely to the axis of the vessel (Plate I fig 6, *Commelina tuberosa* the same form is often met with in the *Canna indica*)

In other cases, and this is the habitual organization, the rings are removed to a greater or less distance from each other, and are separated by a regular spiral fibre, which, according to the distance of the rings, describes one or more volutions, and frequently even a great number Of this there are several modifications very generally from a ring will proceed a spiral fibre of the same width as the annular fibre, the distance of whose coils is nearly equal to that of the rings in the portion of the vessel which exhibits this structure (fig 9, of the Gourd), the other extremity of the fibre being similarly annexed to a complete ring, followed by rings, either isolated or again reunited by spiral fibres

Very frequently also the spiral fibre placed between two rings does not proceed to a junction with the rings, but its extremities become attenuated and terminate at some distance from the ring In the stem of the Gourd this is nearly as frequent as the preceding case (fig 2 *a*, *Commelina tuberosa*, fig 9, Gourd)

Often also, from two diametrically opposite points of a ring proceed two fibres in a continuous parallel direction

Cases are sometimes met with, although rarely, where two rings are united by fibres slenderer than the annular fibre, which generally form a single coil, or at least only a small number of coils (fig 1, 7, 8, *Commelina tuberosa*) This occurs in a very evident manner in the vessels whose rings are not homogeneous, but where the spiral fibre is divided by several fissures into threads united in net-work, as in the vessel represented in figure 1 The width of the fibres uniting the different rings presents no exact proportion to the width of the annular fibre, being sometimes about the half of it (fig 8), sometimes considerably less (fig 1) The point of union of the spiral fibre with the annular fibre is especially deserving of consideration When examined with a sufficient magnifying power, we sometimes find (fig 7, 8) that a part of the annular fibre separates itself to ascend in a spiral direction, but that, in general, at the point of junction of the two fibres the annular fibre does not become thinner, the spiral fibre being attached only to the lateral edge of the annular fibre, which preserves an uniform thickness throughout its entire extent (fig 1, 9, 10) There are even instances in which this union does not take place in the direction of the spiral, but where the spiral fibre terminates in two divergent branches (fig 10 *a*, *Commelina tuberosa*) separating right and left, and confluent with the annular fibre

An examination of the proportions above mentioned, between the annular fibres and the spiral fibres which unite them, must excite doubts of the accuracy of Schleiden's theory of the origin of annular vessels In fact the division which takes place in many rings is, as we have seen, nothing less than a proof of the ring being composed of the two united fibres of a spiral fibre, whilst, on the other hand, the direction of this division parallel to the edges of the rings is quite opposed to Schleiden's theory, and shows us that, in these more or less divided rings, we see a transition from the simple ring to two rings, situated at considerable distances from each other An organization entirely analogous is also found in the spiral fibre, for there are spiral vessels traversed in the middle by a narrow fissure (fig 4, 6, *Commelina tuberosa*), by which the decomposition of the simple spiral fibre into two fibres placed at certain parallel distances is indicated

What chiefly militates against the formation of rings by the united spiral coils of a spiral vessel, is the proportion which the rings bear to the spiroid fibres which unite them And first, when the organization of the vessels is very regular, the rings and the fibres are generally of the same width (fig 4, 9), which could not be the case if the rings were composed of a double twist of the fibre If then the spiral fibres which unite the rings are slender, the width of these fibres bears no exact proportion to the width of the rings and of the divisions perceived in them (fig 1), moreover, the fibres are sometimes soldered to the rings, and sometimes separated from them The spiral fibres, when they are united to the rings, cannot be considered in certain cases, and according to the form of the point of union, as a part of the fibrous mass which forms the ring, this part separating from the ring, and continuing in a spiral direction

I have thought it right to explain these considerations, in the first instance, upon the annular vessels in a state of complete development, because observations made on developed vessels are necessarily more precise and certain than those made on young vessels, not so much on account of the larger size of the developed vessels, but because, in consequence of the greater thickness of their fibres, of the greater distance of these organs from each other, and of the absence of the mucilage with which the young vessels are gorged, these developed vessels present a much clearer contour, and the organization of their fibres is more easily observed. Doubtless it is true that we ought not to infer from the structure of a developed organ the mode of its development; but the examination of this structure is nevertheless of very great importance in studying the manner of its development, since we always thence obtain the means of proving the truth of any theory propounded on the history of development, a theory which ought not to be in contradiction with the results of an examination of the developed organ. Now in the present case this contradiction assuredly exists between the structure of the developed annular vessels and the theory of Schleiden.

Let us now see what information the examination of the young vessels gives us of the mode of their development. At first I selected the stems of different plants, especially of *Tradescantia tuberosa*, because Schleiden announced that he had remarked the metamorphosis of spiral vessels into annular vessels in the youngest internodes of subterranean and ascending stems. The results have not been favourable to the theory of Schleiden. For this examination it is not proper to select vessels placed at the interior angle of the vascular bundles, because these pass too rapidly through the phases of their development, and their diameter is also too small; the coils of their fibres being moreover at first too close together to allow any observations made upon them to be considered as conclusive. The larger vessels, placed more towards the exterior, present less difficulties in these respects, though here also an unfavourable circumstance occurs, viz. that the rings in the course of their development, in consequence of the feeble longitudinal growth of the vascular utricles, remain very close together, which may, in some cases, render the distinction of the annular and spiral formations in the fibres difficult, and which, in all cases, makes it rather hard to decide whether there does or does not exist between each pair of rings a slender spiral fibre which is subsequently absorbed. However I think I have observed with certainty, that from the beginning, and so soon as I could distinguish the fibres on the interior surface of the vascular utricle, under the form of thin, more or less narrow, diaphanous edges, they were not absolutely spiral; but that, as in the developed vessels, they formed either complete isolated rings, or rings intermixed with spiral fibres; so that, with the exception of the thinness of the fibres, and of the small distance of the rings from each other, there is no essential difference observable between them and the perfectly developed vessels

The examination of the vessels of the stem not having, however, furnished me with a perfectly satisfactory result, and my former researches on the roots of Palms and other monocotyledonous plants having shown me the greater facility of studying the development in this organ than in the trunk, I submitted the roots of *Tradescantia* to a very attentive examination, the results of which I consider to be quite conclusive The examination of the roots presents this great advantage over that of the stems, that in the larger vessels, placed nearer to the centre, the fibres are not developed until a sufficiently late period, when their longitudinal growth is already terminated At the period when the fibres of the vascular utricles are developed, these utricles have not only already attained to a considerable size, but the fibres in them are also, from the beginning, arranged at greater distances from each other, and their successive development may be followed in detail step by step, from one end of the root to the other This examination is rendered easier in consequence of the vessels being deposited in a very transparent cellular tissue In these researches I have recognised with the greatest clearness, and with a perfect conformity to what I had previously observed in the roots of Palms, that, from the time when the fibres make their appearance, and when they are still so tender, narrow and transparent, that it is often only possible to see them with a faint light, they already present all the different modifications of form which are observed in the perfect vessels We then find, as at a later period, the same alternation of annular and spiral and reticulated fibres, but I have never seen the least trace of the formation in all vascular utricles of a spiral fibre whose coils would unite in pairs, and the portions of the spiral fibre serving as the means of union be absorbed, and I consider it as perfectly impossible that this transition of spiral vessels into annular vessels, if it existed, could have escaped me, because in a great number of roots I have followed the vessels from the moment when the utricles presented closed cells with thin parietes, and enclosed a nucleus

Hence it results that the development of the annular vessels agrees with the observations made on the perfect vessels Researches into these two organs show that annular, spiral, and reticulated vessels afford three different forms, very intimately connected, and passing frequently one into the other, but that they must not be considered as temporary degrees of metamorphosis of the same vascular utricle It is true that a spiral organization is the ordinary and normal state in the secondary layers of the vessels, but it is not the only state to be found there Annular organization occurs as a primary formation, and presents in some degree an intermediate form between the spiral wound to the left and that wound to the right Moreover, reticulated organization is also found primitively, sometimes more nearly resembling the pure spiral, and sometimes the annular form

Consequently, my researches on annular vessels afford opposite results to those of Schleiden Nevertheless, I am far from pretending that he has observed badly, on the contrary, he appears in these researches as a skilful phytotomist, and as one experienced in the use of the microscope, but I think his interpretation of what he saw to be far from exact, inasmuch as he has considered accidental though persistent variations of form as normal, transitory and necessary stages of the metamorphosis

V —*Preliminary Reply to* Mohl's *Essay on the Structure of Annular Vessels* By Dr M J Schleiden*

M Mohl has answered my challenge more speedily than I could have expected, and published his remarks in opposition to my late treatise These relate only to my views regarding the origin of annular vessels It is to two points especially that I purpose at present to call attention

I am almost ashamed to mention the first, viz Mohl's correction of my notion, that the crossing of the pore-like fissures depends upon the apposition of oppositely turned spirals The thing is so simple, that I scarce understand what demon of thoughtlessness possessed me when I entertained the notion, and, in spite of the mortification of being caught in so marvellous an hallucination, I thank him from my very heart for having in so friendly a way rid me of this goblin. I should scarcely deem it necessary to mention the matter at all did I not consider it the indispensable duty of every conscientious inquirer to retract openly and expressly every known error, as the so doing is the only surety that he is indeed anxious for truth

The other point concerns the main subject itself The history I gave of the development of annular vessels respected only the simplest case, that of rings arising from a single thread, and I feel confident that I have not deceived myself in the cases alleged, since my researches were made on vessels which, when mature, are purely annular, so that I could not but believe that I had before me not mere persistent modifications of structure, but really stages of transition, even though I could not have regarded the observed forms as actually detected in the act of development, not to mention, among other circumstances, that the persistent ring is distinguished by the sharpness of its outline, the firmness and clearness of its substance, from the yellowish gelatinous transitory portion with its eroded and defaced margin observed in the moment of dissolution I trust now that Mohl himself will be convinced of the rectitude of my assertions in these particular instances

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* Translated from Flora, 1840, p 1 Communicated by the Rev M J Berkeley

As regards the other forms, as they are figured by Mohl f 1—6, 10 (Pl I), they do not come under the notion of annular vessels as defined by me in my treatise, but under that of reticular formations, whose reference to one or more deformed spirals is as easy or even easier than in porous organizations

But, in general, I might pronounce the conclusion as to the mode of development from the perfect form as highly improper, for it cannot have escaped Mohl, that, after the formation of the original spiral, in many cases secondary threads are developed as members of union, which consist of quite a different substance, since they are soluble in boiling alkali, yet apparently do not differ from the spiral, and make the perfect comprehension of the fundamental spiral extremely difficult I consider the part of Mohl's figure 10 marked (*a*) as of this nature The formation of such secondary threads is frequently observable in reticulate vessels and in some forms of scalariform vessels They occur, however, in the most remarkable degree in the large purely spiral vessels of the stems of *Scitamineæ*, as in *Hedychyum coronarium, Canna*, &c, when on their gradual decline they are filled with cells Such a peculiar luxuriance of the threads then takes place that the originally pure spiral vessel is only distinguished from a porous vessel by the perfect regularity of the pores Moreover what moves me especially to adhere still to my views, is the philosophic necessity, in a faithful investigation of nature, to limit the number of principles of interpretation so long as the impossibility of referring a phænomenon to an old principle does not imperatively require a new one

As such in point of fact, as respects the present state of science, must I now freely regard Mohl's discovery of the primary development of annular organisms, and nothing now remains but to let both modes of origin stand separately by each other I by no means, however, think that such will always be the case The conciliation of this schism will then only be effected, when the solution of a far greater puzzle, viz the construction of the spiral and its peculiar genesis, shall be achieved, and I would beg Mohl to direct his attention to this, as I myself have done long since Heartily should I rejoice with him should it fall to his lot to solve this problem as he has already done in so many other cases

VI —*Report of the Results of Researches in Physiological Botany made in the year* 1839 By F J Meyen, M D, Professor of Botany in the University of Berlin

[Continued from vol vii p 471]

On the Evolution of Heat by Plants

A very beautiful series of experiments on this subject has been published by MM G Vrolik and W H de Vriese*, they have continued their researches on the evolution of heat in the spadix of *Colocasia odora*, they were published at the end of 1838, but we received the journals too late to be able to insert them in our former Report

The above-mentioned observers express their astonishment at the explanation given by M Raspail of the evolution of heat in the spadix of the *Aroideæ*, but add that their new observations were not made in order to disprove Raspail's view, for that is not necessary The first observations were made with the spadix of *Arum italicum*, they were made in the open air, and no rise of temperature was observed in the interior of an orangery another flower exhibited a considerable increase of warmth, and also when the light was shut out and the spatha removed, still an increase of temperature took place, as was to be expected Moreover experiments were made with the spadices of *Colocasia odora* under similar circumstances, both when the spadix was cut away and when only turned back, the maximum difference between the temperature of the air and the interior of the spadix was 19¾° Fahr

Moreover interesting experiments were made on the phænomena exhibited by the spadices of *Colocasia* in different gases, for which purpose a very excellent apparatus was contrived The rise of temperature in two perfectly similar spadices which happened to be in perfection at the same time was observed, one in the common air and the other in the above instrument in an atmosphere of oxygen The latter in half an hour exhibited a temperature 4° higher than the one in the air Oxygen was passed into the apparatus from time to time, it was confined by means of water, which also absorbed the greater part of the carbonic acid produced by the inflammation (verbrennung) of the spadix In nitrogen no rise of temperature was observed, and it could not be seen that any gas was absorbed, all vital activity, and even the colour, were lost

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* Tijdschrift voor Natuurl Geschieden en Phys, vol iii pp 190—230, also in Wiegmann's Archiv for 1839, p 135

M de Vriese* has also communicated some observations made by a M C Hasskarl, in Java, on the spadices of *Colocasia odora*, he found 22° Fahr as the greatest difference between the temperature of the spadix and that of the external air, and this in the morning at eight o'clock, the next morning there was only a difference of 10° Fahr

M Dutrochet† observed the evolution of heat in the spadix of *Arum maculatum* by means of a thermo-electric instrument, which MM van Beck and Bergsma (vide former Report, p 83) also employed, he found the highest temperature exactly at the time when the spatha opens, and this exceeded the temperature of the air by from 11° to 12° C In another note‡ of the 11th of May, M Dutrochet mentions, that during the night the temperature of every part of the spadix of *Arum maculatum* decreases, and increases again by day, it reaches its maximum early in the day, then diminishes, and disappears altogether in the night

In the sitting of the Parisian Academy § of the 10th of June, M Dutrochet's researches on the temperature of plants (which had been delivered in on the 1st of July, 1838) were read He says—plants possess a peculiar warmth, but this is completely absorbed by the evaporation of the sap, by the evolution of oxygen by day and of carbonic acid by night It rather seems that, in the natural state, plants possess the property of producing cold, for they almost always have a lower temperature than that of the surrounding air If however the evaporation is prevented, it becomes easy to observe the proper temperature of plants, for this purpose M Dutrochet used a thermo-electrical apparatus For the sake of comparison the experiments were made both with living and dead plants, the latter acquired the temperature of the surrounding medium, the former the same, with the addition of that which was hindered or destroyed by the evaporation, the latter M Dutrochet reckons in maximo at $\frac{1}{4}^\circ$ Cels , it is often only $\frac{1}{6}^\circ$, or even $\frac{1}{10}$° or $\frac{1}{12}$° The proper heat of young twigs and leaves vanishes during the night, or in general in the dark, and appears again under the influence of light The higher the external temperature, the greater is the vegetable warmth That part of the heat of plants which is carried off by the evolution of oxygen cannot be determined quantitatively

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* Tijdschrift, &c, 5 iii pp 230—233

† Comptes Rendus de 6 Mai 1839, p 695

‡ *Ibid*, p 741

§ *Ibid*, 10 Juin 1839, pp 907—911

M Dutrochet had probably given the above researches into the safe keeping of the Academy, in order to secure to himself the priority of the discovery, however, the proofs that plants possess a peculiar heat resulting from their vital activity have been long since published in Germany, and in the second part of my 'Physiology,' published in the beginning of the year 1838, I have proved that an evolution of heat is exhibited not only by germinating seeds and by the fresh fruits of *Areca Catechu* when lying together, but also by leaves and herbs in general, "singly they do not exhibit any warmth on account of the evaporation, but so much the more when they lie together in masses" It must not be believed that I state this as a simple idea or theory, for I have convinced myself of its correctness with the thermometer in my hand, I have several times experimented with fresh-cut grass and fresh spinach leaves* At the same time I showed, that those botanists who wished to prove or disprove the existence of vegetable heat could not choose a worse part for their experiments than the *wood* The very low degree of warmth mentioned by M Dutrochet is not sufficient to prove the existence of vegetable heat, for in my first Report (Wiegmann's Archiv, 1835) I have mentioned some experiments, according to which bad conductors, as for instance, the wood of chairs and tables in my room, exhibited an excess of heat of 2° R above that of the air, etc A note which M Dutrochet has added to the above letter on the 6th of June 1839, states that his new researches confirm the former ones In the stem of *Euphorbia lathyris* he saw the vegetable heat amount to $\frac{1}{3}$° C, but only so long as it was in a verdant state He also remarked the heat in the roots, fruits, and even in the embryos Complete exclusion of light totally prevents the rise and fall of temperature, but this does not always take place the first day, M Dutrochet remarked the change of temperature by night and by day even on the second day of the experiment

From some remarks on the above treatise of M Dutrochet† made by M Becquerel, it appears that he had used the thermo-electrical apparatus for determining the heat of plants two years ago The observations were made in company with M. Mirbel in the botanical garden on the twigs of an *Acacia* observations on dead and living boughs gave directly the most striking differences of temperature In the following year M Dutrochet wished to institute similar experiments, and made use of the advice and experience of M Becquerel* In the sitting of the Academy of 1st of July, M Dutrochet replied to the statements of M Becquerel, and endeavoured to show that his observations by no means proved with certainty the existence of a peculiar heat in plants

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* Is not the accession of heat in this case the result of fermentation?—Ed

† Comptes Rendus de 17 Juin, p 939

MM Bergsma and van Beck†, in consequence of Dutrochet's researches, have sent a letter to the Academy at Paris, in which they describe their new experiments on the heat of vegetables, by which it is clearly proved that the transpiration is the cause of the difficulty in measuring the peculiar temperature They chose (in January 1839) a hyacinth growing in a glass for their experiments The glass was put into another vessel containing water of a higher temperature, in order in this manner to increase the activity of the roots

The needles of the thermo-electrical apparatus were then inserted into the external parts of the flower-stalk, and instead of an increase of temperature, they observed a fall, the apparatus exhibited, viz 17 5° C, while that of the water was 28 5° The experiment was repeated several times with like success, as also with the pedunculus of *Entelea arborescens,* R Br This phænomenon is explained by the powerful evaporation which is caused by the increased activity promoted by the warm water When the needles were inserted into the middle of the flower-stalk of the hyacinth, the temperature of the interior was found to be 1° higher than that of the surrounding air

All the above treatises of Dutrochet, Becquerel, Bergsma, and van Beck, are to be found in the August number of the 'Annales des Sciences Naturelles'

On the 21st of November M Dutrochet‡ communicated to the Academy some new observations which he had made during the previous summer on the heat of vegetables, he states generally that plants possess a peculiar heat, which is principally located in the green parts This heat exhibits a daily periodicity, it reaches its maximum towards midday, and its minimum during the night M Dutrochet communicated his special experiments on different plants, from which the daily variations of temperature may be recognised, *e g* in

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* Comptes Rendus de 1 Juillet, p 47 † *Ibid*, 2 Septembre, p 328
‡ *Ibid*, 18 Nov, p 613

Euphorbia lathyris, L, which exhibits a considerable heat, which vanishes completely during the night, whilst in other plants traces of it remain The hour at which plants reach their maximum temperature is the same for each single plant, but different for different plants, thus for instance, *Rosa canina* at 10h, *Allium Porrum* at 11h, *Borago officinalis* at midday, *Euphorbia lathyris* at 1h, *Sambucus nigra* at 2h, and *Asparagus offic* and *Lactuca sativa* at 3h The greatest heat is in the neighbourhood of the principal bud, and in woody plants often only in the green extremities Other experiments confirm the fact, that plants growing in the dark lose their vegetable heat, but experiments on different fungi showed that these also possess a daily periodicity, *Boletus æneus* exhibited a heat of ½° C

Finally M Dutrochet* has published a short note on the heat of the spadix of *Arum maculatum* The spadix exhibited the greatest heat in the first day of blossoming, and by its influence the rapid opening of the spatha was produced, on the second day the maximum was not so high, and was situated principally in the male flowers, by which the dispersion of the pollen was effected What *Arum maculatum* here exhibits on the large scale is also seen in the young twigs of all other plants

On the Odours of Plants

The Academy of Sciences of Brussels has given as a prize-question for 1838, "The production of odours in flowers," which, as it remained unanswered, was repeated for 1839 As an answer to this question, M Auguste Trinchinetti de Monga, formerly Professor at the University of Pavia, has sent in a memoir, which has been rewarded with the silver medal, and M Morren has, in the name of the Academy, delivered a circumstantial report of this work, from which we shall here select the most important parts

The work is divided into two sections, the first treats of the odours of flowers in general the author speaks of the difference between the odours of the flowers and of the other parts of plants, of the organs of flowers which exhale the odours or from which they proceed, of those in which they are prepared, of the chemical characters of these substances, of the manner of exhalation, and lastly, of the function of odours In the second part he treats of the odours in respect to their intensity, their quantity at different periods of the development of the flower, and in respect to the hours at which they are perceptible, he at the same time gives methods to investigate them, and speaks principally of intermitting odours There is found, says M. Trinchinetti, in all the parts of plants a certain odour arising from resinous or camphorous substances, as in the *Laurineæ, Labiatæ, Umbelliferæ,* and *Hesperideæ*, on the contrary, the odours of flowers are the effects of a particular function, by which a simple evaporation of the secreted substances is produced [This, as well as most of the other statements, which are disproved by already existing observations, have been proved incorrect by the reporter M Morren] In general, the principal residence of the smell is in the upper surface of the corolla, if there is only a simple perigonium, the smell comes from its inner surface The filaments have a smell similar to that of the corolla, the anthers, on the contrary, have a spermatic odour, the female organs are rarely odorous, as in saffron The organs which evolve the odorous substances are, according to the author, always glands, which are said to have often escaped the observation of physiologists, however, M Morren states that the author has applied the name of glands to some formations which certainly cannot be so called, *e g* he has held the resinous globules for glands, which I first discovered in the petals of *Magnolia grandiflora*, indeed M Trinchinetti considers the papillæ on the petals to be organs in which these odoriferous matters are secreted In relation to the chemical theory of the formation of odours, the author has only given that of Fourcroy and Couerbe, and he explains the exhalation of the odoriferous substances by a simple evaporation through organic and inorganic (?) pores, which takes place on the epidermis of the inner or upper surface of the flowering organs If this upper surface be covered with wax, the result is said to become weaker, if the under surface be covered it remains the same, and turgescence increases the exhalation

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* Comptes Rendus de 16 Dec, p 781

The question, " For what purpose do flowers smell?" is answered by M Trinchinetti as follows —It may be that the smells of plants were destined as a source of pleasure for mankind, and by these they exhibit their medicinal properties However, nature strives doubtlessly to effect more than one object by these odours,—they are evidently intended to assist the sexual functions of the flowers, for M Trinchinetti believes that the sexual organs are nourished by a sap which is prepared in the petals The odorous exhalations of flowers exert a physical influence on the sexual organs, inasmuch as they diminish the tension of the steam which is so very injurious to the pollen which is burst by it, and thus fertilization cannot take place He states that the flowers are surrounded by an odoriferous atmosphere which defends the sexual organs from the injurious influence of the aqueous vapours, hence it comes, that flowers in which the sexual organs are much closed do not smell; on the contrary, other flowers smell strongest exactly in the dampest hours of the day and night.

In the second part of the treatise M. Trinchinetti considers the odours in detail; he says, that flowers which become odorous towards the end of their existence, as for instance *Asperula odorata*, produce this smell by the commencement of decomposition, and that it is not a product of vitality; that there are flowers which, when pressed, evolve a different smell to what they do in their natural state, e. g. *Allium moschatum*, *Sambucus ebulus*, &c. Flowers which only smell in the morning, evening, and night, lose their smell during the day by the action of the light and heat, which dissipate the odorous principle; but to this M. Morren answers, that these plants do not even smell by day when inclosed in a damp, dark place. Finally, the author attempts to answer the question as to the cause of intermitting odours: flowers which exhibit this phænomenon either open and shut at fixed periods, or they remain always open, and only the smell is intermittent: thus the inquiry is divided into two parts; in the first the phænomenon is brought in connexion with the cause of the opening and shutting of the flower, and in the second a peculiar physiological cause as producing it is assumed. In the first case flowers are either shut by day and open and odorous by night, or *vice versâ*. In the second part those plants are mentioned which are always open, but possess an intermittent smell; here are also two divisions, the flowers smell either by day or by night. In *Cestrum diurnum* the smell is much weaker by night: *Coronilla glauca* smells only by day, and *Cacalia septentrionalis* is said to lose its smell when protected from the rays of the sun. *Pelargonium triste* begins to smell about five in the afternoon; in the night the smell becomes stronger till about five in the morning, whereupon it diminishes, and disappears entirely at seven. The surfaces of these odorous petals are said to exhibit in the evening shining corpuscles (cells filled with sap) which are not seen in the day. If the plants were kept the whole day in the dusk, the smell made its appearance later than usual and was also much weaker. Moist air produced no smell in the plants during the day; on the contrary, *Cestrum nocturnum*, kept in the dark and in a moist atmosphere, exhibited a slight smell.

On the Formation of Colours in Plants.

M. Elsner has drawn attention to the fact, that in the year 1832, in a treatise in Schweigger-Seidel's Annual of Chemistry (lxv p 165—175), he had already proved the identity of the red colouring matter in the flowers of the *Irideæ, Labiatæ, Rosaceæ, Ranunculaceæ Geraniaceæ, Cannaceæ, Malvaceæ, Leguminosæ, Papaveraceæ, Myrtaceæ*, &c , and that the red colour in the bracts of *Melampyrum arvense*, in the leaves of *Caladium bicolor*, in the fruit of *Prunus cerasus, Ribes rubrum, Sorbus ancuparia*, is similar, and that the identity extends to the red matter which colours the leaves in autumn

From M Morren* we have received anatomico-physiological researches on the appearance of indigo in *Polygonum tinctorium*, the work had been read to the Brussels Academy before the appearance of a similar one by M Turpin, which was mentioned in the former Report, and is therefore to be considered as cotemporary with it The views of MM Turpin and Morren on the production of the indigo differ from each other The former found this substance in the sap-globules of the cells which were coloured green by chlorophyll, but M Morren believes that the indigo is produced in the intercellular sap (by which is meant the ordinary cell-sap) I may here state with certainty, from my own observations, that the blue colouring matter in *Polygonum tinctorium* is formed out of the previously green-coloured cell sap globules Whether however, in the colourless cell-sap of that plant, a substance is contained in solution which changes into indigo (as appears from M Morren's statements) I cannot say, having made no decisive observations, and this is not at present the time for it The expressed sap of the leaves ought to be perfectly filtered and then treated for the formation of indigo, by which the question would be settled Indigo is formed in all parts of *Polygonum*, but principally in the leaves, here it is found in the parenchym and also in the nerves, and only the "tissu fibro-vasculaire" does not contain a trace

M Morren directs attention to the regular position of the adventitious roots in this plant, which, as is so often the case with the genus *Polygonum*, grow out of the nodes

M Hunefeld† has communicated some more of his continued researches on vegetable colours, he has also found that there is not the same similarity between the colours of the different parts of plants, as for instance, the roots, leaves, flowers, and fruits, as would seem from outward appearances, and as some botanists have asserted Very few changes of colour in plants are produced by the action of acid or basic substances Moreover M Hunefeld has published a long series of experiments which he made on the behaviour of vegetable colours to several liquids, more especially æther, oil of turpentine, and some others, in the course of which several curious facts have been brought to light, the conclusions which M Hunefeld has drawn, and which may interest us, are—the pigments of reddish yellow, or of *not*-yellow flowers, are probably all of an extractive nature

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* Mém de l Acad Royale des Sc , &c , de Bruxelles, tome xii

† Beitrage zur Chemie der Pflanzenfarben —Erdmann & Marchand's Journal fur prakt Chemie, 1839, 1 Bd p 65—80

For the examination of these colouring matters æther is a very useful solvent The variety of colouring of a flower or leaf frequently arises from the deposition of one pigment over the other, or from their mixture [On this subject better information is to be had from the newer phytotomic works — *Mey*] The principal change which the colours suffer in withering, etc appears to be, that the assimilation of carbon only ceases by suppressed vegetation, while the absorption of atmospheric oxygen becomes excessive, for the easily oxidizable extractive matters, and tannin in oxidized extractive matter, become metamorphosed into gallic acid and into substances approaching more and more to humic acid, which then destroy the pigments

M Hunefeld* has also made a series of experiments to learn whether the formation of certain colours depends on iron contained in the plant Quantities (one or two ounces) of the most different-coloured flowers were reduced to ashes Some of these flowers contained evidently iron and manganese, others only iron, and traces of copper were found in the flowers of *Sambucus nigra*, which had already been noticed The twigs and leaves of *Sambucus nigra* are said to contain no copper, but a considerable quantity of iron Traces of manganese were found everywhere when sufficient quantities were burnt As these metals, says M Hunefeld, are found also in white flowers, and their quantities stand in no relation to the colours of the flowers, it seems that Meissner's theory is not correct There is probably no vegetable which does not contain iron, and perhaps all the iron found in the human body is derived from this source

[To be continued]

VII —*Indian* Cyprinidæ By John M'Clelland, Assistant Surgeon Bengal Medical Service†

Dr Patrick Russell published in 1803 an account of 200 species of fishes found chiefly on the coast of Coromandel, there appears to be no copy of his work in Calcutta, nor have I been able to meet with it in India, but his collection appears to have embraced few *Cyprinidæ*, and scarcely any of those afterwards found in Bengal by Dr Buchanan* The fishes of Ceylon, as well as those of the Bay of Bengal, have recently excited the attention of naturalists †, while those of the Sunderbuns and the vicinity of Calcutta have long been objects of interest to collectors for the museums of France and the other parts of the continent where alone ichthyology seems to have been cultivated as a philosophical branch of zoology

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* Beitrage zur Chemie der Pflanzenfarben —Erdmann & Marchand's Journal fur prakt Chemie, 1839, 1 Bd p 84—87

† From the 'Asiatic Researches, vol xix part ii p 217, having been presented to the Asiatic Society of Bengal on the 5th of September 1838

2 Dr Buchanan appears to be the only author who has devoted his attention to the freshwater fishes of Bengal, and his success seems to have left little for others to do in the way of discovering new species His 'Gangetic Fishes,' published in Edinburgh in 1822, contains descriptions of no fewer than eighty Cyprins, of which number he has only given figures of twenty-one And unfortunately, Cuvier appears to have adopted such only as were figured in that work, leaving the rest as doubtful materials, which, from their extent, and the deficiency of the details connected with them, perhaps deterred him from the task of entering into, or finishing, his account of the Carps, in the hope of receiving further particulars regarding them from India

3 It was partly with a view of supplying this deficiency that I devoted the time we spent on rivers, during our journey ‡ to Assam in the winter of 1835-6, to the examination and figuring of species The obscurity of Buchanan's specific descriptions, which with few exceptions are chiefly composed of characters of generic value, rendered the task of identifying his unfigured Cyprins most difficult and uncertain Nevertheless it appeared to me to be a desideratum that must be accomplished sooner or later by some one, and at length, after perseverance for the better part of three years, occasionally giving it up in despair, I succeeded in identifying most of the species unfigured by Buchanan, as well as in having made two series of finished drawings of them, one set for England and one for India After all this, and after the present paper had been ready for publication in April last, my notice was, for

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* Afterwards Dr Buchanan Hamilton As most of his publications have appeared under the name of Buchanan, authors should follow the example of Cuvier in the 'Regne Animal and 'Histoire Naturelle des Poissons in referring to the author of the 'Gangetic Fishes' by the name by which he is best and will be universally known, in proportion as his vast works on Indian statistics and natural history transpire

† Mr Bennett and my friend Dr Cantor

‡ I allude to the deputation of Dr Wallich, Mr Griffith, and myself to Upper Assam

the first time, attracted by a remark of Buchanan, in consequence of which I thought it necessary to make inquiry for certain drawings alluded to, 'Pisc Gang' p 316. I had heard of drawings at the Botanic Garden, but never saw them, and always supposed them to be merely the originals of published figures, but I confess I was quite unprepared to receive at that time a collection of drawings from Dr Wallich, amounting to 150, beautifully executed, and including nearly all the unpublished species on which my painters had been so long employed, with the specific names in Buchanan's hand-writing marked under the figures, so as to leave no doubt or difficulty in referring them to corresponding descriptions in the 'Gangetic Fishes.' I am not prepared to state how many unfigured species this interesting collection contains, except in the particular family which is the subject of this paper. Along with these drawings I received intimation from Dr Wallich, that two folio volumes of manuscripts and drawings on general zoological subjects, by the late Dr Buchanan, still remain at the Garden. The descriptions alluded to may probably serve as a key to Hardwicke's 'Illustrations,' into which I perceive several figures of *Cyprinidæ* have been accurately copied, except in the colouring, from Buchanan's drawings, and as no descriptions of the plates of Hardwicke's work have been yet to my knowledge published, the source from whence the figures in question came does not transpire, and there is no allusion to it on the plates, at any rate it is unfair to General Hardwicke, as it is to Dr Buchanan and to all who are engaged in pursuits connected with the natural history of this or any other country, to have the unpublished works of any man shut up for twenty-two years in a library that is not open to the public*

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* Buchanan's Researches regarding the fishes of India commenced on his arrival in the country in 1794, and ended with the publication of the Gangetic Fishes in 1822. Anything that tended to lessen the value of a work that occupied so much of such a life is to be regretted. It is stated in a biographical notice of Buchanan in Chambers's 'Lives of Scotchmen,' that on his departure from India he was deprived by the Marquis of Hastings of all his extensive drawings and papers relating to every branch of natural history, *particularly botany*, "although to me, quoting his own words to the Edinburgh Philosophical Society, 'as an individual, they were of no value, as I preserve no collections, and have no occasion to convert them into money, but I was merely desirous of seeing them safely deposited in the India House. In deciding that Buchanan's papers should be retained in India, it may be presumed that the object was, that they should here be rendered more useful to the country than they could be in England. It could scarcely have occurred to the Marquis of Hastings that these works would be consigned to oblivion, and the author in consequence superseded by his successors

The following are the names of the unpublished figures of *Cyprinidæ* in this collection of drawings*

Cyprinus Gugani *Buch*
——— Gorachela *id*
——— Joya *id*
——— Cachius, *id*
——— Loubuca *id*
——— Phula *id*
——— Bhola, *id*
——— Gora *id*
——— Borelio, *id*
——— Renio, *id*
——— Dangila, *id*
——— Balibola, *id*
——— Bukrangi *id*
——— Loya *id*
——— Phulchela, *id*
——— Titius, *id*
——— Terio *id*
——— Sutiha *id*
——— Phutunio *id*
——— Gelius, *id*
——— Kanipunte, *id*
——— Casuatus, *id*
——— Cursis, *id*
——— Cursa, *id*
——— Chola *id*
——— Conchonius, *id*
——— Jogia, *id*
——— Shakra, *id*
——— Barna *id*
——— Vagra, *id*

Cyprinus Borila, *id*
——— Anjana, *id*
——— Bata *id*
——— Bangana *id*
——— Pangusia, *id*
——— Sarana, *id*
——— Kunta, *id*
——— Tor *id*
——— Sada, *id*
——— Lati *id*
——— Gohama *id*
——— Godeyara, *id*
——— Dheno *id*
——— Jauyali, *id*
——— Paungsi *id*
——— Bimaculatus, *id*
——— Sucatio, *id*
——— Balitora *id*

Cobitis Gongota, *id*
——— Balgara *id*
——— Cucura, *id*
——— Guntea, *id*
——— Botea, *id*
——— Pingia *id*
——— Biltura *id*
——— Turia *id*
——— Scuturiginum *id*
——— Savona *id*
——— Corica, *id*

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* But although they seem to have been withheld from Buchanan himself, the following drawings from his original collection of unpublished figures of fishes have found their way from the Botanic Garden into Hardwicke's 'Illustrations, without any acknowledgement to point out from whence they were derived

Tab 84 *Hypostomus sisor*, Buch , *Sisor Rabdophorus*, id , Gan Fish , two drawings

Tab 85 *Malopterus Kazali*, Buch Two figures name changed to '*Malopterus* (*Atha*) *Bengalensis*,' Gray, in the pirated figures

Tab 86 fig 1 *Cyprinus angra*, Buch Pirated figure disguised under bad colouring, and named '*Cyprinus Hamiltonii*, Gray —Fig 2 *Cyprinus goha*, Buch Colouring much exaggerated There are two figures of each species, so that this plate has been taken wholesale from Buchanan

Tab 87 fig 3 *Cyprinus chedra*, Buch A good copy of a very beautiful drawing in Buchanan's collection

Tab 89 fig 1 *Syngnathus carce*, Buch (*Kharke*, id , orig draw) Note —an error in spelling the generic name of this species, as written by

4 An examination of the viscera connected with the digestive organs, together with the form of the mouth, suggested the possibility of identifying something on which the natural arrangement of fishes might be founded In those Carps whose mouths are constructed for the collection of vegetable food, I found, as might be expected, the greatest development of intestinal canal, in these the mouth is invariably either horizontal or directed downwards, as in the Cirrhins all such

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Buchanan on the original drawing, is preserved in the pirated copy Fig 4 *Syngnathus deol pata,* Buch

Tab 91 fig 1 *Mystus chitol,* Buch Colouring much exaggerated in the pirated copy

Tab 93 fig 1 *Cyprinus mosal,* Buch Two figures, and two of *Cyprinus morala,* id The coloured copy of this last is so badly executed, that the characteristic marks of the species, though well depicted in the original by the obscure transverse streaks crossing the sides, are quite omitted in the copy

Tab 94 fig 1 *Cyprinus tileo,* Buch

Tab 95 fig 1 *Ophisurus boro,* Buch This species is referred to Buchanan s manuscripts, but nothing is said to point out from whence the drawing was obtained, but it is so accurately traced from Buchanan's original, as to remove any doubt on that score —Fig 2 *Ophisurus harancha,* Buch By mistake on the part of the plagiarists in numbering the figures, the details of the first are given to the second species —Fig 4 *Muræna raitaborua,* Buch, disguised under the names of *Rataboura* '*Hardwickii,*' Gray, thus not only depriving Buchanan of the honour of figuring but also of naming a new species As an instance of the little reliance to be placed on those who thus appropriate the works of others, it is necessary to observe, that the outline figure representing the lower parts of *Muræna raitaborua* is transferred to *Ophisurus bora,* in return for that of the last having been given on the same plate to *Ophisurus harancha* In other plates not numbered, forming the 19th and 20th parts, are printed as follows —

Holocentrus? Kalkaya, B MS, two figures, name changed to '*Pterapon trivittatus* —*Cottus chaka,* B MS, name changed to '*Platycephalus chacca,* marked '*natural size* '—*Checlodipterus Bhutibue,* B MS, name changed to '*Checlodipterus Butis,*' and the species referred to 'Hamilton,' but nothing said of the source of the two figures —*Cyprinus morar,* B MS, two figures, and *Cyprinus gora,* B MS, forming an entire folio plate the name of the latter changed to '*Cyprinus cora* —*Clupanodon chapra,* B MS, pirated figure called '*Alosa chapra,* N Indian Ocean ' what the latter terms mean I cannot say, as the figure is from Buchanan s unpublished drawings of Gangetic species, like the remark 'natural size annexed to *Cottus chaka,* it is certainly calculated to impress the reader with the belief that the author had seen the specimens from which the drawings were made Neither of the remarks in question appear on the original drawings, which are characterized in Buchanan s hand writing

Buchanan died in 1829 The work to which so much of his labour has been transferred was published in 1833, and although no descriptions of the plates have yet appeared, it is no excuse for having suppressed the source from whence so many of them at least were derived, especially when it was thought necessary to acknowledge the source of other figures in the same work These circumstances induced me to visit the Botanic Garden, with types I have included under the head of *Pæonominæ* or herbivorous Carps, of which the Gudgeons and Gonorhynchs are the most remarkable

5 In the last-mentioned genera the mouth is situated completely under the head, and is constructed in the Gudgeons for bruising soft vegetable substances, such as are found in

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the view of ascertaining if all the other plates in Hardwicke's 'Illustrations,' as well as those of fishes, were derived from the two folio volumes stated to be in the library of that institution The following memorandum, which was made on the occasion, must be interesting to all who are in any way connected with zoological pursuits

"Botanic Garden, 3rd September 1838 —Having obtained the requisite permission, I inspected Buchanan's zoological MSS for the first time, they seem to contain descriptions and figures of the following animals —

"Five species of *Simia*, one recently described by Dr Harlan in the American Phil Transac as *Simia Hoolook*

"Five species of *Felinæ*, one grey above and spotted beneath, a *Felis-leopardus albus*, and an *Ursus*

"Six *Cervidæ*, a *Cervus niger*, Buch Several species of *Mus*, two bearing Buchanan's specific names, also an Ichneumon and a *Hysterix opeigura*, Buch , three species of *Capra* bearing his specific names, as well as several species of Tortoises, two species of flying Foxes two *Lacertæ*, and two *Paradoxuri*

"Of birds I observed about sixty species of *Falconidæ*, about 150 Insessores, and about 74 *Grallæ* including many rare *Tantalidæ*, and the species of *Ciconia* recently described as *C cristata*, which appears to have been named nearly thirty years ago by Buchanan *Ardea crinita* , all which, in addition to the fishes, are drawn in duplicate, thus amounting to about 900 drawings Although Buchanan was professedly a botanist, his researches appear to have extended to all branches of natural history except entomology His volumes on Gangetic Fishes, published at his own expense, under the disadvantage of being deprived of the greater part of his figures, are the only part of his zoological labours that are known yet his inquiries in other branches of zoology were equally extensive, and equally entitled to publicity It now appears that two quarto volumes of MSS , written with his usual erudition, have been retained in the library of the Botanic Garden since 1815 , while every periodical that has since appeared deprived him of some portion of those claims to priority which his papers ought to have secured to him had they been placed in proper hands, or deposited in an institution where their existence could have been known or appreciated

Had such an injury to the advancement of information resulted from an oversight in an ordinary public office, the circumstance would excite less surprise , but that the works of a naturalist should be so treated in a public institution expressly intended for the promotion of science, is so unaccountable to me, that I cannot presume to express an opinion on the subject But as the case stands, perhaps the best remedy that can now be applied, in justice to Buchanan as well as to others who are still engaged in scientific pursuits, would be to give a complete edition of his labours, botanical and zoological, to the public , at the same time it is right to say, that no atonement can now make amends for the injury that has been inflicted on Buchanan as a naturalist, or for the time that has been lost in allowing others to go over unnecessarily the ground which he investigated, instead of beginning where he left off stagnant waters, and in the Gonorhynchs for tearing and uprooting certain kinds of confervoid plants, which form a short slimy covering to the rocks on which they grow in clear mountain streams

6 The true Cyprins (*Cyp proprius*, Cuv), together with the Barbels, Cirrhins and Labes, subsist less exclusively on a vegetable regimen Their mouths are invariably small, and either directed downward or situated low in the head, and as far as my inquiries have extended, it is on such modifications of the mouth that we find the length of the intestines and the habits of the different groups to depend

7 In the Gudgeons the mouth is formed simply for receiving a kind of food that is obtained in abundance without any effort, and which requires no prehensile teeth or other organs for its collection or preparation before it is submitted at once to the process of digestion The mouth is consequently small, and is opened and closed chiefly by the muscular structure of the snout, the jaws are weak, and the lips hard and cartilaginous, without sensibility or muscularity, and their intestinal canal varies from eight to eleven, and even twelve lengths of the body, including the head and caudal fin except in the *Hypostomi*, Lacep, among fishes, Ostrich among birds, and perhaps some of the ruminants, such development of the abdominal canal is rare, a circumstance which it will be necessary afterwards to recollect when speaking of types

8 In the Gonorhynchs the muscular power of the snout is greater than in the Gudgeons, the mouth is smaller, and situated further back in the lower surface of the head, the lips thicker, and though defended externally by a hard insensible cartilage, are formed for very powerful muscular action In this genus the length of the intestinal canal is usually about eight lengths of the body, and exceeds that of all other Cyprins except the Gudgeons

9 The development of the intestinal canal in *Cyprinidæ* differs with the habits of species, so as to afford something like a basis for true distinctions between the different genera, and is fortunately connected with such peculiarities of form and colour as to render it easily available as a guide to an improved method of classification

10 The philosophical views of Mr MacLeay regarding the circularity of groups, left it almost certain that the law which applied to other classes might be also applied to fishes, and as the essence of that law consists in the tendency of the contents of natural groups to form a circle, it became highly probable, that as strictly herbivorous Carps were known, so, on the contrary, carnivorous species might be expected also to

exist* This is exemplified by a comparison of typical with subtypical groups, as *Quadrumana* with *Feræ* in the orders of Mammalia, and *Insessores* with *Raptores* in the orders of birds, as this is true with regard to higher groups, it should be just as applicable to the lower assemblages when they happen to be equally complete in their parts

11 The above inference, whether its principles be just or not, has proved to be perfectly correct, notwithstanding the remark of Linnæus, that Cyprins are perhaps the least carnivorous of the whole class of fishes, "feeding chiefly on seeds, grass, and even mud," and the observation of Cuvier, "that they are the least carnivorous of all fishes" Those who have since written on the subject have for the most part adopted the views on this point of the great authorities just named

12 A close investigation of our Indian species has led to very different results, and enabled me to form *Cyprinidæ* into three subfamilies First, the *Pæonominæ*, or herbivorous Cyprins, already adverted to, which consist of species whose habits accord with the views of Cuvier and Linnæus, and *Sarcoborinæ*, or carnivorous Cyprins, consisting of several natural genera, and *Apalopterinæ*, including the *Cobitinæ* or Loaches, the *Pæcilianæ* Cyprinodons, and other genera, which in the 'Règne Animal' appear to have little connexion with the family, as well as some new forms peculiar to India

13 As the peculiarities of the first subfamily, consisting in the form of their mouth and digestive organs, have been pointed out, I shall now proceed to notice the characteristics in structure and habits of the several groups of *Sarcoborinæ* Two of the most remarkable genera of this subfamily are the Perilamps and Opsarions, the first consisting of small insectivorous fishes remarkable for the brilliancy of their colours, always disposed in streaks The second are lengthy, handsome species, larger than the Perilamps, though still of small size, and very bright in their colours, which are however disposed in cross-bars,—these are exclusively carnivorous, and remarkably voracious

14 The Perilamps (*Perilampus*) form the connexion between the Systoms and Leuciscs The mouth is placed in a directly opposite position from that which it occupies in the typical forms of the *Pæonominæ*, the jaws are directed upward, and their apices are placed on a level with the back or crown, their intestine is short, and in no instance exceeds the length of the body, and their food consists of insects only, which they derive by springing from beneath the surface of

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* I here refer particularly to what Mr MacLeay calls affinity of transultation, or that relation which the opposite points of a circle of affinities bear to each other

the water, thus forming a direct contrast to the Gonorhynchs and other *Pæonominæ*, whose food is exclusively derived from sandy, rocky, or muddy bottoms Eleven or twelve species of this new genus are described in this paper

15 The Opsarions (*Opsarius*) differ from herbivorous Cyprins still more widely in their œconomy and habits The body is long, the mouth widely-cleft and horizontal, and though without teeth, the symphysis of the lower jaw is armed with a sharp hook in the more characteristic, but which is blunter and less prominent the further we pass from the most typical forms, but this hook, more or less developed, is characteristic not merely of the Opsarions, but of the subfamily (*Sarcoborinæ*) to which they belong It is received into a corresponding depression in the apex of the upper jaw when the mouth is closed The back is straight, the dorsal is placed opposite to a long anal, both fins being situated near the caudal extremity, by which the power of darting or springing is rendered most perfect* The abdominal cavity is long, and is chiefly occupied by a straight stomach of equal length, which is divided by a strangulation from a short fleshy intestine connecting the stomach directly with the vent, without any convolutions or elongation of the tube

16 "The energies of nature," to use the words of Mr Swainson, "are here concentrated as it were to the production of that form most adapted for one especial purpose," that of springing on their prey like the *Felinæ* or Cats, which they seem to represent It is no uncommon thing to find an Opsarion so overgorged that the tail of its prey remains protruding from the mouth, to be swallowed after that portion which is capable of being received into the capacious stomach is sufficiently digested to admit of the introduction of the remainder†

17 Two other genera of this subfamily remain to be noticed, viz *Systomus* and *Leuciscus* The first is made up chiefly of small species named Pungti by the Indian fishermen If we were merely guided by their general appearance and the form of their fins, the only principle of division hi-

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* The principal instrument of progressive motion in fishes is the caudal fin, other fins, as shown by Roget, are mere auxiliaries, serving to balance the body while it receives propulsion from the tail Vide 'Bridgewater Treat, i 286 This is correct in regard to fishes in general, but in the Opsarions and Perilamps, the dorsal and anal, from their position and size, contribute greatly to their velocity, being also situated on or near the tail, thus increasing the caudal surface, which, as Roget justly observes, operates as an oar does in sculling

† I have seen Opsarions so often in this state, that I presume they are easier caught in it than in any other A similar power of deglutition is recorded of sea gulls by Blumenbach

therto adopted in this family, they might be brought into the several subgenera, *Cyprinus proprius*, *Cirrhinus*, &c of the 'Règne Animal' Buchanan, who published his 'Gangetic Fishes' cotemporaneously with Cuvier's system, had not an opportunity of consulting its divisions, while those of Lacépède, Bloch, and previous writers were not reconcilable to Indian species, Buchanan therefore formed temporary groups for his own convenience, applicable to the local features of the family in this country The Pungti, like all his other groups, were formed according to native opinions of their habits unshackled by artificial views, and being better marked than most genera, Buchanan's Pungti have more or less affinity to each other

18 The stomach and intestine of the Systoms are in none of the species I have examined more than thrice the length of the body, and the former, which is thick and fleshy, usually contains the remains of insects The mouth is small, and when opened the intermaxillaries project so as to form a narrow tube,—hence their generic name

It is in the Systoms we first perceive a tendency to the hook or prominence on the apex of the lower jaw after quitting the herbivorous genera, and for this reason, as well as other peculiarities which appear to point them out as a typical or most perfect group, they are placed first in the list of carnivorous genera

19 The Leucisci, or white fishes, succeed the Perilamps In this genus the prominence on the lower jaw is more distinct, and I have restricted the genus to such as possess this character, having at the same time the dorsal and anal small—the former placed anterior to the latter They are all carnivorous, but not constructed for leaping above the surface like the Perilamps, nor for springing like the Opsarions, although the shortness of the intestines, size of the stomach, and prominence of the tooth on the lower jaw prove them to be scarcely less rapacious, yet I am not sure as to the accuracy of separating them from one or other of the preceding genera merely on account of the size and position of the dorsal and anal fins, particularly as the dental hook is only of importance in distinguishing them from some of the *Pæonominæ*

20 After this outline of the structure of *Sarcoborinæ*, a few remarks regarding their colours will be necessary, as embracing another principle on which the divisions have been formed The whole of the subfamily *Pæonominæ* are remarkable for their uniformly plain colours, consisting of olive-green, bluish grey, or brown, extended along the back, and softened off on the sides, so as to leave the lower surface of the body an impure white, partaking more or less of the colours of

the back The fins partake of the sober hues of the adjoining parts of the body, the pectorals and ventrals, as well as the branchial membranes and irides, usually displaying after death a slight blush of red, caused by the capillary effusion of blood in those parts Of the species with which I am acquainted not one possesses a brilliant spot of any pure colour, but when we approach the limits of the next group, we begin to find in the Gonorhynchs obscure dark spots on either side of the tail of some of the species, as *G bimaculatus*

21 But, on the other hand, as soon as we cross the verge of the herbivorous group and enter the carnivorous, we find such spots as those alluded to become brighter and more numerous, and the opercula and fins to be stained with yellow and red in deep and natural tints To *Systomus,* the first genus of this group, the Gold-fishes*, commonly called Golden Carp, belong The intestinal tube of the Systoms, though only thrice the length of the body, or half the length of the abdominal tube in those herbivorous species in which it is shortest, is nevertheless twice the length of the same organ in any of the other *Sarcoborinæ* As we advance in this subfamily from the Systoms towards the Opsarions, we find, as has been shown, the abdominal tube diminishing in length, and in proportion as this takes place, and the habits of species become more carnivorous, we observe the brilliancy of the colours becomes more remarkable

22 The Perilamps, as already stated, are followed by the Leucisces In these the diversity of colour is not great, but is compensated for by the metallic brilliancy of the nacre, or silvery pigment with which the scales and opercula are covered, and from which the genus has derived its name, *Leuciscus, Albus,* or white fishes, though not applicable to all the species, for there is one which is marked on each side with the bright longitudinal streak of the Perilamps, and, like the blending of the markings already observed between the *Pæonominæ* and *Sarcoborinæ,* the species in question, *Leuciscus lateralis*†, seems to unite the white fishes with the Perilamps

23 The Perilamps in their structure naturally follow the Systoms, and present numerous bright longitudinal lines of various colours, but particularly blue on their sides They are all small species, of little or no direct utility to man, nor is it possible to account for the peculiar brilliancy of their colours in any other way than as an instance of that inscrutable de-

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* *Cyprinus auratus auctorum*

† *Cyp Danconius,* Buch, which appears to me to be identical with *Cyp Anjano,* id , but if not, the latter species, on account of certain peculiarities about the mouth which seem to be wanting in the former, must be referred to the Perilamps

sign, by which it would seem that, in pursuit of aquatic insects, on which they subsist, along the surface of waters, they become the better marks for Kingfishers, Skimmers, Terns, and other birds which are destined to keep the number of fishes in check, especially in deep waters beyond the reach of the Waders*

[To be continued]

VIII —*Notes on Birds* By T C Eyton, Esq , F L S

No IV

Psophodes Crepitans, Vig and Horsf

Tongue nearly the same as in *Menura Lyra* Trachea largest at the upper extremity but gradually contracted towards the inferior larynx, the tube bound firmly down in the angle made by the rami of the os furcatum The inferior larynx furnished with five pairs of muscles of voice as among the Crows and Warblers the sterno-tracheales weak the other pairs of muscles connected with the trachea moderately developed Œsophagus of moderate size, largest at the upper extremity, narrowed near the middle and again slightly swelling above the proventriculus which is of moderate size Gizzard filled with the remains of insects muscular, and of moderate size Intestinal canal of large diameter in proportion to the size of the bird, largest a little below the duodenum rectum short about equal in diameter to the duodenum , cæca rudimentary, cloaca rather large

Length of intestinal canal from stomach to cloaca 9½ inches Length of rectum 1¼ inch Sternum rather elongated and straight on the posterior margin between the fissures which are two in number one situated near each lateral margin, nearly closed posteriorly, deep, oval, and large Keel shallow nearly straight on its inferior edge, traversed by raised bony ridges as in *Menura* , the anterior edge of the keel and the manubrial process also resemble in shape those portions in the above named genus

Os furcatum long without any process at the point where it joins the sternum , the rami rounded, and bending slightly inwards, so as to approach each other near the middle , coracoids, pelvis, ribs, scapula, and caudal vertebræ also as in *Menura* The numbering of the vertebræ is

Cer 11 , Dor 7 , Sac 11 , Caud 6 , Ribs 8, 5 true, 3 false

Remarks —In the structure of the soft parts and tongue *Psophodes* comes very near to *Menura* , the trachea however differs in not having the muscles of voice so strong, and in their being disposed as among the Warblers and Thrushes *Menura* and *Psophodes* also agree in the form and length of the coracoids, scapula, and ribs, showing in these parts an affinity to Scansores, though not so strongly marked as in *Me-*

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* See remarks on *P perseus* in a subsequent part of this paper

nura and *Pteroptochos* The bones forming the pelvis approach very nearly in form and disposition to those of *Menura*, differing in no particular except in their smaller size The sternum is broader in proportion to its length than in that genus, and agrees in the form of its posterior margin with the Thrushes and Shrikes, generally not having the portion between the lateral fissures produced as in *Menura* The os furcatum agrees with the last-named genus in having the rami rounded, and in being destitute of a process at the extremity approaching the sternum, but in having the rami bent laterally inwards near the middle, so as to approach each other, it agrees with the Shrikes and Thrushes

Not having been able to obtain a specimen of the South American genus *Thamnophilus* to dissect, it is of course merely conjecture, when I state that I believe the anatomy of that genus will be found to approach very nearly to that of *Psophodes*, referring to the external characters, although the bill differs much in form, the nature of the plumage and the form of the tail and wings are very similar

Craticus Tibicen, Vieill

Trachea muscles of voice tongue and œsophagus as among the *Corvidæ* generally Intestinal canal of moderate length cæca scarcely more than rudimentary, cloaca large gizzard of moderate size oval flattened, muscular interior surface (epithelium) hardened, transversely rugose filled with the remains of insects

Length of œsophagus	4	inches
Length of rectum	$\frac{3}{4}$	,
Length of intestine	20	,,
Length of cæca	$\frac{1}{4}$	,,

The skeleton of *Craticus Tibicen*, like the soft portions, does not differ materially from the general structure found among the *Corvidæ*, the scapula, however, is rather broader near the hinder extremity than in the middle, and the sternum proportionably larger than in any other *Corvidæ* with which I have had an opportunity of comparing it The number of the vertebræ are

Cer 12, Dor 8, Sac 12, Caud 8, Ribs 8, 5 true, 3 false

BIBLIOGRAPHICAL NOTICES

Wiegmann's Archiv für Naturgeschichte Seventh Year Part I 1841 Berlin

We have already apprised our readers of the intended continuation of this valuable journal, (established and so ably conducted by our friend the late Prof A Wiegmann of Berlin,) under the superintendence of Dr Erichson, in conjunction with Dr Grisebach in Gottingen, Prof von Siebold in Erlangen, Dr Troschel in Berlin, Prof A Wagner in Munich, and Prof Rud Wagner in Gottingen The abundance of excellent original articles in the first number which has just appeared convinces us that no pains have been spared that this periodical should maintain its station among the first-rate journals devoted to Natural History In the plan nothing has been altered, it will, as usual, be accompanied by annual reports, that on botany, so well executed by the late Prof Meyen, has passed into the able hands of the celebrated Link Many of the papers we shall from time to time place before our readers but for the present we must confine ourselves to merely indicating the contents with a few extracts

The first paper by Dr Erichson is entitled ‘ A glance at the Classification of the Evertebrate Animals ’

The second paper by Sars is ‘ On the Development of *Medusa aurita* and of *Cyanea capillata* This article confirms the beautiful observations of Von Siebold on the younger stages of *Medusa aurita* The author had likewise observed that *Strobila* is merely a young state of this *Acalephe* The results which the study of the development of these animals has led to are too important not to be noticed in this place, and we trust some of the lovers of natural science who dwell near the coast may be induced to lend their assistance in the investigation of this branch of science in which so much still remains concealed The author has given at the end of the memoir a summary of the results of his investigations, which we subjoin

1st The oval or oval cylindrical young escape from the eggs contained in the ovaria provided with vibratile cilia on the eggs are observed the *Vesicula Purkinji* and the *Macula* (*Vesicula*) *Wagneri*, the yolk exhibits the usual partitions or furcations The young collect in the cotemporaneously developed marsupial pouches appended to the four oval tentacula

2nd They soon quit the mother, and swim, like Infusoria about for a time, at last adhere to some foreign body, to which they fix themselves with their unbranched end at the other free end a mouth opens, around which a circle of tentacula is gradually formed

3rd In this polypoid condition, which may fairly be termed a larva state, they already multiply and indeed in the usual manner of Polypes, by means of buds and so called stolones The new animals thus produced resemble perfectly the larva

4th Lastly, after the lapse of a still undetermined time the larva voluntarily divides into a number of diagonal pieces, all of which become new animals These do not resemble the larva, but are discoid creatures, which swim about freely, their periphery is divided into eight rays, bipartite at the extremity, and they have a quadrangular, tubular, pendent mouth Gradually, as they grow the rays become shorter, the spaces between them where the marginal tentacula issue forth grow larger, the mouth divides and changes into four oral tentacula—in short, these animals become perfectly identical with the original mother (the *Medusa* or the *Cyanea*) It is, therefore not the larva or the individual developed from the egg which is converted into a perfect *Acalepha*, but its progeny, originated by diagonal separation Among known facts none can be compared better with this mode of development than that of the *Salpæ*, although even here it differs considerably The numerous observations which I made last autumn on the *Salpæ* have shown that Chamisso (who had to hear so many ill words on his upright researches from several naturalists because they did not accord with their systems) observed in general their development correctly The *Salpæ* agree with the *Acalephæ* in this, that it is not the larva, but its progeny, which is developed to the perfect animal it is not the individual, but the generation, which has become metamorphosed

The author observes in conclusion, that Graham Dalyell's observations (Edinb Philos Journ vol xxi 1836) with which he was only partially acquainted from what had appeared in Wiegmann's 'Archiv' and the 'Isis, may serve in part to confirm his observations "His (Dalyell's) *Hydra Tuba* appears to be the above-described polypoid Acalepha larva on which he also noticed buds he moreover observed the diagonal separation by which the radiated *Acalephæ* (*Strobila*) originate Of these latter he has figured one with eleven and one with eight rays, in general I have found eight The quadrangular column, of which Dalyell incorrectly asserts that it projects on the convex side is the pendent mouth, at the base of which four organs are mentioned by him (the fold-circles with their tentacula) But in the explanation of the observed phænomena, his views differ from mine In February and March he says, 'the surface or disc of some *Hydræ* are furnished with a pendent flexible prolongation of an inverted conical form, &c which is developed into 20 to 30 layers, which gradually separate and become free *Acalephæ* But whence this prolongation arises, and in what connexion it stands with the *Hydra*, he does not state One might almost be inclined to think that he ascribes to the polype viviparity According to my observations, it is the animal itself, the polypoid larva which separates into diagonal pieces beginning above and gradually descending towards the base How the tentacula of the polype disappear, and after all the diagonal pieces have become free, what becomes of the lower part of the stalk, I have, it is true not yet been able to see That the polype again fixes itself as Dalyell maintains, after the disappearance of the prolongation, acquires new tentacula, and again adopts its former form, is opposed entirely to my observations, and appears to be founded upon an erroneously conceived observation" This paper is accompanied by 4 plates containing 64 figures

3 'On the curious motion of the Colour cells (Chromatophores) of Cephalopods' by Rudolph Wagner "If everything does not deceive me, these observations lead to a new series of phænomena of motion in organized nature A new class of active motions appears here together with the ciliary motion of the sap in a rotatory course in cells, and the motion of the Spermatozoa, which has nothing to do with muscular motion"

4 ‘On Stinging Organs of the *Medusæ*, and the occurrence of peculiar formations in Evertebrate Animals, which appear to constitute a new class of locomotive organs,’ by Rud Wagner

5 ‘Zoological Notices’ by Dr A Philippi These we shall subsequently give in continuation of those which have already appeared in the ‘Annals We will now enumerate the various heads 1 *Fossarus*, a new genus of Mollusks 2 On the genus *Eulima* Risso 3 On the genus *Truncatella* Risso 4 On *Tornatella* 5 *Onchidium nanum*, n sp 6 *Euplocamus laciniosus*, n sp

6 ‘Contributions to a systematical knowledge of the Larvæ of Insects,’ by Dr Erichson 1st part The Larvæ of the Coleoptera

7 ‘Grouping of the Genera of the Rodentia into Natural Families with descriptions of some new Genera and Species, by Prof A Wagner The first part of this paper consists of a review of the literature on this subject in which great praise is bestowed on the labours of Mr Waterhouse*, to whose classification, however it is objected, that not all families are reduced to their proper limits and that some have been discarded which must be re established The author divides the Rodentia into twelve families founded not merely on external habits but chiefly on the structure of the skeleton and the dentition, in some cases the intestines have likewise been consulted

I Pedimana Digiti anteriores longissimi, pedes posteriores pollice instructi, cranium rotundatum, orbitæ postice clausæ

Only one genus belongs here, *Cheiromys* Hab Madagascar

II Sciurina Pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda dense pilosa, dentes molares $\frac{5}{4}$ ossa frontalia dilatata, processu postorbitali distincto instructa foramen infraorbitale angustissimum

Genera *Sciurus Pteromys Tamias Spermophilus Arctomys*

This family is represented in all parts of the world with the exception of New Holland

III Myoxina Pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda elongata villosa, dentes molares $\frac{4}{4}$, ossa frontalia valde coarctata, processu postorbitali privata, intestinum cæcum nullum

M Wagner has separated the only genus of which this family consists into the four sub-genera *Graphiurus*, *Eliomys*, *Glis* and *Muscardinus* Geographical distribution confined to the Old World

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* Mr Waterhouse's paper, ‘Observations on the Rodentia,’ &c Mag Nat Hist 1839, pp 90, 184, 274 and 593, and ‘On the geographical distribution of the Rodentia, Annals of Nat Hist No 33 (1840) p 418, and Proc Zool Soc for Nov 1839, see also ‘Observations on the skulls of the *Caviidæ* and *Chinchillidæ*, Proc Zool Soc, April 1839, and ‘Observations on various Rodents in the Zoology of the Voyage of the Beagle’

IV **Macropoda** Artus distincte saltatorii, anteriores brevissimi, posteriores longissimi, cauda longa pilosa, foramen infraorbitale magnum

The four genera belonging here are divided into two sections

a Dentes molares irregulariter incisi

Dipus *Scirtites,* mihi (*Alactaga* Fr Cuv) *Jaculus,* Wagl

b Dentes molares ab uno latere partiti (*Meriones,* F Cuv) *Pedetes*

Geog distrib Over Asia and a small part of European Russia, Africa, Northern America and one occurs on New Holland

V **Chinchillina** Auriculæ magnæ, scelides antipedibus subduplo longiores cauda producta, supra et ad apicem longius setosa vellus molle, dentes molares $\frac{4}{4}$ e laminis 2–3 parallelis compositi

Three genera *Eriomys* (*Chinchilla*) *Lagidium* (*Lagotis*), *Lagostomus*

Geog distrib South America

VI **Psammoryctina** Habitus murinus, artus proportionales auriculæ mediocres (rarius magnæ) foramen infraorbitale magnum mandibulæ angulus in cuspidem elongatum excurrens dentes molares $\frac{4}{4}$

α *Habrocoma*
Octodon
Psammoryctes

β *Capromys*
Aulacodus
Loncheres
(*Nelomys* and *Echimys*)
Cercomys
Dactylomys
Petromys

Confined principally to South America

VII **Cunicularia** Corpus crassum cylindraceum, caput obtusum oculi minuti aut tecti auricula et cauda nulla aut parvæ artus anteriores posterioribus robustiores, pedes 5-dactyli, dentes primores exserti, lati, truncati

α Ungues anteriores breves
Ommatostergus
Spalax
Chtonoergus
Rhizomys
Georhychus
Ctenomys

β Ungues anteriores longissimi
Siphneus
Ascomys
Thomomys
Geomys
Bathyergus
Haplodon (*Aplodontia,* Richardson)

Geog distrib South-eastern Europe, Asia, Africa and America

VIII **Murina** Oculi distincti, auricula et cauda plus minusve exsertæ, artus posteriores anterioribus longiores, pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda nuda aut minus pilosa, foramen infraorbitale longitudinale, supra dilatatum, infra angustatum, mandibulæ angulus rotundatus, dentes primores inferiores acuminati

a Molares 2/2
Hydromys

b Molares 3/3

α M tuberculati	β M plani, opposite incisi	γ M alternatim incisi	
Mus	*Mystromys*	Sigmodontes	*Sigmodon*
Cricetus	*Rhombomys*		*Neotoma*
Dendromys	*Psammomys*		*Elimodon*
Akodon	*Meriones*		*Reithrodon*
Hapalotis	*Euryotis*		*Ctenodactylus*
Pseudomys		rvicolidæ	*Myodes*
			Hypudæus
			Fiber

c Molares 4/3
Sminthus

d Molares 4/4

α M tuberculati	β M plani, incisi
*Perognathus**	*Saccomys*

Distributed over the whole earth

IX Castorina Corpus robustum, magnum pedes 5-dactyli, posteriores palmati, dentes primores validi, cestiformes, molares 4/4 complicati latere altero triplicati, altero implicati

Castor, Myopotamus

Geog distr Northern & temperate districts of Old & New World

Myopotamus belongs to the southern half of South America

X Hystricina Corpus aculeis teretibus validis setis intermixtis vestitum foramen infraorbitale maximum, claviculæ incompletæ, dentes molares 4/4 complicati

a Philogæa	β Philodendra
Hystrix	*Erethizon*
Atherura	*Cercolabes*
	(*Synetheres* and *Sphiggurus*)

Southern Europe, Asia, Africa and America

XI Subungulata Corpus pilis tectum, cauda brevissima aut nulla, ungues subungulæformes foramen infraorbitale permagnum, claviculæ incompletæ, dentes molares 4/4

a Molares complicati	*b* Molares compositi
Dasyprocta	*Hydrochærus*
Cœlogenys	*Cavia*
	Kerodon

Confined to South America

XII Duplicidentata Dentes primores superiores duplicati, foramen infraorbitale parvum, foramina optica conjuncta, palatum osseum singulariter coarctatum, claviculæ partim incompletæ, partim completæ

Lepus, Lagomys

Distributed over the whole earth with the exception of NewHolland

* *Dipodomys*, Gray (see vol vii p 521), will perhaps be placed here

The new genera and species described are —

Rhombomys Dentes primores superiores sulcati, molarium laminæ obtuse rhomboideæ, medio dilatatæ, os interparietale transversim coarctatum habitus murinus, cauda longa crassiuscula, dense et breviter pilosa, apice subfloccosa This genus is founded on *Meriones robustus* Fr Cuvier s *Gerbille indéterminée* (Trans Zool Soc ii 2 p 143) belongs decidedly here

Rhombomys pallidus Rh supra pallide flavidus, subtus albido-lutescens, auriculis parvis, cauda crassiuscula, supra isabellina, infra lutescente, apice nigro-fasciculata, dentibus primoribus superioribus bicanaliculatis

Body	5″	6‴	Tail without hair	5″	1‴
Projecting hair	0	6	Length of ear	0	6
Hinder foot to apex of the claw				1	5

Hab South eastern Russia

Mystromys Dentes primores læves haud sulcati molarium lamellæ (2–3) medio anfractæ, parte altera paululum post alteram posita auriculæ pilosæ amplæ, cauda breviter et dense pilosa mediocris apicem versus attenuata

M albipes M subbrunneo griseus nigro irroratus, subtus griseo-albidus pedibus albis, cauda supra fusca, infra albida

Body, in straight line	4″	11‴	Body curved	5″	3‴
Tail	2	4	Length of ear	0	9½
Hinder foot with claw	0	11½	Breadth of ear	0	7

Hab South Africa

Euryotis pallida Wagn E supra flava nigro intermixta, lateribus subtusque e lutescente albida, auriculis mediocribus, cauda supra nigra, basi flavida, subtus lutescente dentibus primoribus superioribus bisulcatis inferioribus unicanaliculatis

The length of the largest specimen in a straight line is 5″ 9‴, curved 6″ 1‴, of the tail the apex of which is wanting, 2″ 7‴, of the smaller specimen, the body curved = 5″ 3‴, tail 2″ 6‴

Hab South Africa

Dendromys pumilio, Wagn D fulvus subtus albus

Body in straight line 2″ 8‴, curved 2″ 11‴, tail 3″ 8‴, ear 0″ 5‴, front foot with claw 0″ 4½‴, hinder foot 0″ 8‴

Hab South point of Africa

Pteromys aurantiacus, Wagn Pt supra aurantio fulvus subtus albidus, sparsim ochraceo lavatus, patagio prope carpum in angulum acuminatum excurrente cauda plana disticha, castanea

Body 5″ 10‴, tail somewhat mutilated 4″ 3‴, ear 0″ 5‴

Hab Island of Banca

Lepus Mediterraneus Wagn *L timido* multo minor auriculis capite longioribus, medio nudiusculis, apice nigris, nucha artubusque ochraceo-rufescentibus, cauda supra nigra, infra albida, stria alba post oculos

Body in straight line	13″	6‴	Curved	15″	5‴
Head	3	5	Ears	4	3
Tail with hair about	3	0	Ear-fissure	3	8

Hab Sardinia, Gibraltar ?

8 ' On the Genera and Species of the *Comatulæ* by Joh Muller, which terminates the present part

In concluding this notice, we may express the wish that the various parts may appear with more regularity than heretofore

W Francis

The Naturalist's Library Mammalia Vol xi *Marsupialia, or Pouched Animals* By G R Waterhouse, Esq Curator to the Zool Soc Lond

The eleventh volume of this valuable and deservedly popular work containing a history of the ' Marsupialia, or Pouched Animals,' has just appeared The confusion in which the Marsupials have been hitherto involved renders a volume exclusively devoted to them peculiarly interesting, the author of the work being an able naturalist and possessing abundant facilities for the successful prosecution of his labours of which he has availed himself with great acumen and industry in the execution of his task

Mr Waterhouse commences by an Introduction in which a concise review is taken of the history of the Marsupialia from the time of Linnæus to the present day in which the views of various naturalists are examined,—a preliminary step to an exposition of the principles by which he is guided in the arrangement of these singular mammals The point at issue between some naturalists of great eminence—namely whether the Marsupialia constitute a natural group of which the component parts are linked together by such bonds of structural relationship as cannot be dissolved with propriety, or whether the group is unnatural its assumed component parts belonging in truth, to other orders—is discussed with great clearness

Cuvier, Geoffroy St Hilaire, De Blainville, and Owen celebrated no less for anatomical than for zoological knowledge, insist upon the former position Among their opponents are Storr, Illiger Swainson, and Ogilby After detailing the arguments of these scientific men and giving the results of his own analysis of the Marsupials, which he considers as forming a natural order, Mr Waterhouse, alluding to Mr Swainson s erroneous assertions ' that *nearly* all our leading naturalists have acknowledged the artificial nature of the assemblage," thus writes ' I think we might, on the other hand, say with safety that all the most eminent anatomists (these being at the same time zoologists) agree in uniting them I could wish, however, that this important question should not rest upon *authority*,—but to go through the train of reasoning by which the anatomists have arrived at their conclusions, would require more space than can be spared in a volume like the present "

" It has often been stated that the Marsupiata consist of animals of most dissimilar organization, and are united together only by a single peculiarity, however little weight some zoologists may attach to this single peculiarity, its value was almost immediately appreciated by the anatomists and physiologists But I will now proceed to show that the animals under consideration are united by *many* peculiarities these serving to distinguish them from all other quadrupeds, whilst the rich collections now in the British Museum, and in that of the Zoological Society show that the most dissimilar forms of marsupial animals are linked together by species exhibiting the intermediate grades of structure '

Mr Waterhouse next enters into an examination, brief but still satisfactory of their structural peculiarities, in which he refers to the labours of Professor Owen and others who have thrown so much light upon them With respect to the mode in which the species are worked out, we cannot speak too highly In the instances (and they are not few) where a confusion of synonyms has perplexed the inquirer we find the knot unravelled and though in many cases, names given by modern naturalists to old and previously described species must sink we feel assured that the imposers themselves of these names will rejoice, so that science be but benefited The descriptions are full and clear nearly all of them indeed says the author, were carefully drawn up by myself from the original specimens contained either in the museum at Paris the British Museum, or that of the Zoological Society* '

We cannot conclude our notice of the present really valuable contribution to natural history without referring to the plates These, to the number of thirty-four are faithful delineations of the species represented and are at once effective and artistical

PROCEEDINGS OF LEARNED SOCIETIES

ROYAL SOCIETY

May 20, 1841 —The following papers were read, viz —

1 'Catalogue of Geological Specimens procured from Kerguelen's Land during the months of May, June, and July, 1840 '

2 'Catalogue of Birds collected on board Her Majesty's Ship *Terror*, between the Cape of Good Hope and Van Diemen's Land '

3 'Description of Plants from Kerguelen's Land collected in May, June, and July 1840

The above papers are by John Robertson, Esq , Surgeon of Her Majesty's Ship *Terror*, and were presented to the Society by the Lords Commissioners of the Admiralty and communicated by the President of the Royal Society

4 "On the Fossil Remains of Turtles discovered in the Chalk Formation of the South-East of England ' By Gideon Algernon Mantell Esq LL D , F R S

In this paper, the author gives a description accompanied with drawings of a remarkable fossil Turtle, referable to the genus *Emys*, and named from its discoverer, Mr Bensted, the *Emys Benstedi*, which has been lately found in a quarry of the lower chalk of Kent, at Burham, which is situated near the banks of the Medway, between Chatham and Maidstone The specimen discovered consists of the carapace or dorsal shell, six inches in length and nearly four inches in breadth, with some of the sternal plates, vertebræ, eight ribs on each side of the dorsal ridge, a border of marginal plates, and one of the coracoid bones It is adherent to a block of chalk by the external surface of the sternal plates The marginal plates are joined to each other by finely indented sutures, and bear the impress of the horny scales or tortoise-shell with which they were originally covered The expanded ribs are united together throughout the proximal half of their length, and gradually taper to their marginal extremities, which are protected by the plates of the osseous border Mr Bell considers the species to which it belonged as being closely allied in form to the common European Emys, and as possessing a truly fluviatile or lacustrine character The plates of the plastron however, as also the coracoid bone, resemble more the corresponding bones of marine than of freshwater turtles

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* And here it may be observed, that the number of species at present known, all of which are described in the volume before us, amounts to ninety-seven Desmarest, in his 'Mammalogie (1820), has characterized only forty-three

GEOLOGICAL SOCIETY

Dec 16, 1840 —A paper 'On the Relative Connection of the Eastern and Western Chalk Denudations, by P J Martin, Esq , F G S , was read

The author advances this as the first of a series of papers on the construction of that part of the country usually considered as appertaining to the great chalk denudation of the Weald, or more properly the upburst of the secondary formations between the tertiary of the respective basins of London and Hampshire

In venturing on this field of inquiry he professes also to take up the subject where it was left by him in two former memoirs, one published in 1828 under the title of a 'Geological Memoir of Western Sussex with some Observations on Chalk Basins and the Weald Denudation,' the other in the Philosophical Magazine' for February 1829, and to extend the number of demonstrative facts that bear upon the theory of denudation by disruptive violence and contemporaneous aqueous abrasion there brought forward as a corollary to Dr Buckland s theory of 'Valleys of Elevation '

In pursuance of this object he begins by an examination into the arrangement of the great chalk dome of Hampshire and Wiltshire,— the *Patria* of the chalk of Pennant and Conybeare, its anticlinal lines of disturbance or upheaval, and their connections with those of the Weald and the smaller western denudations of Pewsey, Wardour and Warminster

He finds that six great anticlinal lines are the main instruments of the upbearing of this abraded chalk, that the three which characterize the smaller anticlinal western valleys are projected onward and in a manner decussate three others which emanate from the western extremity of the greater valley of the Weald, the vale of Wolmar Forest, from whence he starts his inquiry, and that these lines do not inosculate or enter into each other, approximating indeed, but little in any part of their course, severally dying out, and their respective synclinal lines playing off into each other Their course is rather irregular, and their force exceedingly variable, but their general parallelism is maintained throughout, their progress being E and W, with a point to the N

The Pewsey line, after passing through the valleys of Ham and Kingsclere, is traceable between Woolverton and Hannington on towards Monks Sherborne, and fades away at Old Basing, apparently without entering the tertiary beds of the London basin* This meets in synclinal relation with a line projected from the north-west corner of the Wolmar valley from Pease Marsh, near Guildford, through Farnham and the high chalk range of Froyle, Shaldon, Dummer and Popham and appears to fade away in the country west of Andover where it is lost in the greater swell of the Burghclere Hills, and the more dominant power of the Pewsey upheaval

The anticlinal line of Wardour, left by Dr Fitton (in his 'History of the Beds below the Chalk †) at Harnham Hill, S of Salisbury, Mr Martin finds traceable eastward, north of Dean Hill, and east of the Avon, to the banks of the Test where it dips under the tertiary beds between Michaelmarsh and Romsey, and appears to fade away between the above mentioned river and the Itching In synclinal relation this line is also met and passed by a very remarkable anticlinal, traceable in strict approximation with, and by-and-by to be proved to be the *proximate cause* of the whole line of the South Down escarpment (with a small exception between Lewes and Poynings) from Beachy Head to East Meon In the vicinity of this place at Langrish, it enters the chalk, passes through the anticlinal valley of Chilcomb near Winchester and that city, and is lost in the Bossington Hills pointing towards, but not satisfactorily traced into the Warminster line

The details of all three lines of elevation are made out in the Ordnance Map, and sections given of the most illustrative points and Mr Martin adds some observations respecting the entrance of the great central line of elevation of the Weald into the chalk at Selborne, and its progress westward between the lines of Peasemarsh on the north, and of Greenhurst or the South Down on the south, till it fades away in the great plateau of Salisbury Plain

The author concludes this paper with some reference to the subject of transverse fractures in these several longitudinal fissures, and the cross drainage, to which, like that of the Weald he proposes to return, in extension and emendation of the disquisitions formerly published by him as above alluded to, and which will be adduced as illustrative of the strong probability if they do not amount (in connexion with the phænomena of drift) to absolute proof, of the close relation of the acts of upheaval and violent aqueous abrasion This necessarily implies the belief that the date of these lines of disturbance is posterior to that of all the stratified beds of the south-east part of England, as maintained in the author's former essays, but into the full discussion of which he declines to enter till the whole subject is before the Society

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* The author thinks, that although this line fades away as it enters the tertiary beds at Old Basing, it is probable that, after passing silently along the London basin, it is revived again in the Isle of Thanet, which is a chalk outlier, by protrusion, in the same way that the parallel line of Portsdown Hill, High down, near Worthing, and the Seaford Cliff (figured by Dr Mantell) does on the southern coast

† Geol Trans, Second Series, vol iv p 244 *et seq*

Jan 20, 1841 —A paper was first read, "On the Teeth of Species of the Genus *Labyrinthodon* (*Mastodonsaurus Salamandroides*, and *Phytosaurus* (?) of Jäger) from the German Keuper and the Sandstone of Warwick and Leamington," by Richard Owen, Esq, F G S, F R S

The Warwick sandstone having been considered by some geologists to be the equivalent of the Keuper*, and by others of the Bunter Sandstein† and as its true position remains to be determined, Mr Owen, in the preliminary remarks to his memoir, points out the assistance which the discovery of reptilian remains in the Warwick sandstone of the same generic characters as those of fossils obtained in the Keuper of Germany, may afford in determining the question

Before he proceeds to describe the fossils forming the immediate object of his paper, Mr Owen shows that the genus *Phytosaurus* was established on the casts of the sockets of the teeth of *Mastodonsaurus*, and that the latter generic appellation ought not to be retained, because it recalls unavoidably the idea of the mammalian genus *Mastodon*, or else a mammilloid form of the tooth, whereas all the teeth of the genus so designated are originally and, for the greater number, permanently of a cuspidate and not of a mammilloid form, and because the second element of the word *saurus* indicates a false affinity, the remains belonging not to the Saurian, but to the Batrachian order of Reptiles For these reasons and believing that he has discovered the true and peculiarly distinctive dental characters of the fossil, he proposes to designate the genus by the term *Labyrinthodon*

The only portions of the Batrachian found in the Keuper of Germany which have hitherto been described, consist of teeth, a fragment of the skull, and a few broken vertebræ, and in the Warwick sandstone of teeth only In this memoir, therefore Mr Owen confines his attention to a comparison of the dental structure of the Continental and English remains The teeth of the *Labyrinthodon Jaegeri* (*Mastodonsaurus Jaegeri*, Meyer) of the Keuper are of a simple conical form with numerous fine longitudinal striations, and the teeth transmitted to Mr Owen from the Warwick sandstone by Dr Lloyd, bear a very close resemblance to them Their external characters not being sufficient to establish either specific or generic identity, Mr Owen had sections prepared for microscopic examination of portions of teeth of the *Labyrinthodon Jaegeri* forwarded to him by Prof Jäger, and of the English reptile, and though, from his previous examination of the intimate texture of the teeth of the

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* See Proceedings, vol ii p 453

† Ibid, vol ii p 565

Plesiosaur, Megalosaur, as well as of the Crocodile, Monitor, and most recent Lacertians he did not hope to detect such modifications of structure as would obviously mark specific or even generic identity, yet the slices exhibited such decided characters, and those of the German fossils agreed so intimately with the sections obtained from the Warwick specimen, that Mr Owen was enabled not merely to separate these fossils from all known reptilian animals, but to establish a generic community of character in the Keuper and sandstone remains It was not however until he had caused sections to be made in various directions, and had studied them attentively in comparison with the teeth of true Saurians Batrachians, and other animals, that he was enabled to comprehend the principle of the singular cerebriform convolutions which pervade the dental structure of this remarkable reptile The base of the tooth of the *Ichthyosaurus* approaches most nearly in character to the peculiarities of nearly the entire tooth of the *Labyrinthodon* It is impossible to convey clearly without illustrations the structure alluded to It may, however, be stated that in the fang of the tooth of the *Ichthyosaurus* vertical folds of the external layer of cement (the enamel ceasing at the base of the crown) are inflected inwards at pretty regular distances around the circumference of the tooth, towards the centre to a distance about equal the breadth of the interspaces of the inflected folds the interspaces being occupied by corresponding processes of the dentine which radiate from the central mass of that substance The thickness of this interblended cement and dentine, surrounding the pulp cavity, is about one-eighth of the diameter of the tooth

The plan and principle of the structure of the tooth of the *Labyrinthodon* are the same as those of the tooth of the *Ichthyosaurus*, but they are carried out to the highest degree of complication The converging vertical folds of the external cement are continued close to the centre of the tooth, and, instead of being straight, simple lamellæ, they present a series of irregular folds, increasing in complexity as they proceed inwards and resembling the labyrinthic anfractuosities of the surface of the brain each converging fold is slightly dilated at its termination close to the pulp cavity The ordinary laws of dental structure are, however strictly adhered to, and every space intercepted by a convolution of the folds of the cement is occupied by corresponding processes of the dentine These characters were presented by a transverse section of a fragment of a tooth of the *Labyrinthodon Jaegeri* from the German Keuper which included about the middle third part of a tooth, and Mr Owen considers that the entire length of the tooth might be 3½ inches, and the breadth at the basis 1½ inch

The external longitudinal grooves, which correspond to the inflected folds of the cement extend upwards from the base of the tooth to about three-fourths of its height, decreasing in number as the tooth diminishes in thickness, and disappearing about half an inch from the summit of the tooth Each fold of cement penetrates less deeply as the groove approaches its termination, and Mr Owen conceives that the structure of the upper part of the tooth may be more simple than that of the lower, but he has not yet been able to extend his investigations to it

The dentine consists of a slender, central, conical column or "modiolus," hollow for a certain distance from its base, and radiating outwards from its circumference a series of vertical plates, which divide into two, once or twice, before they terminate at the periphery of the tooth Each of these diverging and dichotomizing vertical plates gives off throughout its course narrower vertical plates, which stand at nearly right angles to the main plate, in relation to which they are generally opposite, but sometimes alternate Many of the secondary plates, which are given off near the centre of the tooth, also divide into two before they terminate They partake of all the undulations which characterize the inflected folds of the cement

The central pulp-cavity is reduced to a line, about the upper third of the tooth but fissures radiate from it, corresponding in number with the radiating plates of the dentine One of these fissures is continued along the middle of each plate, dividing where it divides, and penetrating each bifurcation and process, the main fissures extend to within a line or half a line of the periphery of the tooth the terminations of these as well as the fissures of the lateral processes suddenly dilating into subcircular, oval, or pyriform spaces All these spaces constitute centres of radiation of the fine calcigerous tubes, which, with their uniting clear substance, constitute the dentine The number of these calcigerous tubes which are the centres of minor ramifications, defies all calculations Their diameter is the $\frac{1}{7000}$th of a line with interspaces equal to seven diameters of their cavities

Mr Owen then compares the structure of the section of a tooth procured in the sandstone of Coton End Quarry, and lent to him by Dr Lloyd of Leamington The tooth nearly resembles in size and form the smaller teeth of *Labyrinthodon* figured by Prof Jäger All the peculiarities of the labyrinthic structure of the Keuper tooth are so clearly preserved in this specimen, that the differences are merely of a specific nature

At the upper part of the tooth a thin layer of enamel*, besides a coating of cement, is inflected at each groove towards the centre of the dentine, but about the middle of the tooth the enamel disappears, and the convolutions consist of interblended layers of cement and dentine Thus, on the supposition that the tooth of the *Labyrinthodon* of the German Keuper be capped with enamel, its extent must be less than in the tooth of the Warwick sandstone

The inflected folds are continued for a greater relative distance before the lateral inflections commence than in the German species, and the anfractuosities are fewer in number, and some of the folds are reflected backwards from near the central pulp-cavity for a short distance before they terminate

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* Mr Owen has subsequently ascertained that this is not true enamel, but a layer of firm dentine, separated from the rest by a thin stratum of fine calcigerous cells

The modifications of the complex diverging plates of the dentine hardly exceed those of a specific character, and the dentine itself is composed of calcigerous tubes of the same relative size and disposition as in the *Labyrinthodon Jaegeri*

In a section taken from the middle of a smaller and relatively broader and shorter conical tooth from the Warwick sandstone, Mr Owen found that the anfractuosities were more complicated, with numerous secondary and tertiary foldings, and the external layer of cement was relatively thicker than in the *Lab Jaegeri*

The generic identity of the Reptiles, indicated by the teeth from the Warwick sandstones, with the *Mastodonsaurus* of the German Keuper, Mr Owen believes to be fully established by the concordance of their peculiar dental structure above described And in conclusion he says, if on the one hand, geology has in this instance really derived any essential aid from minute anatomy on the other hand in no instance has the comparative anatomist been more indebted to geology than for the fossils which have revealed the most singular and complicated modification of dental structure hitherto known, and of which not the slightest conception could have been gained from an investigation, however close and extensive, of the teeth of existing animals,

A paper by C Lyell Esq, F G S was afterwards read, " On the Freshwater Fossil Fishes of Mundesley, as determined by M Agassiz '

In a memoir on the boulder formation and associated freshwater deposits of Eastern Norfolk* Mr Lyell stated on the authority of Mr Yarrell and the Rev L Jenyns that the scales and teeth of fishes which had been then procured in the fluviatile beds of Mundesley belonged to the *Esox lucius,* to a trout or an undeterminable species of *Salmo,* to a carp, probably the *Cyprinus carpio,* and to a distinct species of *Perca*

This collection, with some additions recently sent to the author by Mr Wigham, was examined by M Agassiz during his late visit to England The decision of Mr Jenyns with respect to the distinctness of the perch M Agassiz fully confirmed but he was of opinion that the pike differs from the *Esox lucius,* and that the supposed carp is a species of *Leuciscus*, and that the trout is not truly a trout, although one of the same great family

From this examination, therefore, Mr Lyell says it is apparent that these remains belong to species not identical with any European freshwater fishes hitherto described, but that they nevertheless belong to an ichthyological fauna, more modern and more nearly resembling the recent than any other with which M Agassiz is acquainted in a fossil state

Similar remains have been found by Mr Lyell at Runton, near

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* See Proceedings, *antè*, p 171

Cromer, but both there and at Mundesley the associated testacea all belong to living freshwater species even the *Paludina minuta* (Strickland), which Mr Morris has pointed out to the author to be identical with the *P marginata* of Michaud, a living French species It is a question therefore, the author states whether these unknown fishes may not still inhabit the rivers and lakes of the more northern parts of Europe or America especially as M Agassiz is at present unacquainted with the freshwater fishes of Norway, Sweden, Spitzbergen Iceland, Greenland Labrador and Canada and even of the northernmost parts of Scotland and the Shetland Islands and in conclusion Mr Lyell says it seems natural to look northward for types analogous to the Mundesley fishes, because the beds in which they occur were deposited contemporaneously with the drift accumulated by the agency of floating ice

ZOOLOGICAL SOCIETY

Nov 24, 1840 —William Yarrell Esq , Vice-President in the Chair

A paper by W J Broderip, Esq was read, in which the author proceeds with his descriptions of the new species of shells collected in the Philippine islands by H Cuming Esq

Helix (Cochlostyla) Ticaonica *Hel testa subpyramidali truncatâ, anfractibus* 5 *ventricosis ultimo longe maximo, apice subcomplanato, lineis incrementi subobliquis levissime striato, aperturâ modicâ*

Var *a* *Brunnea, strigis obliquè longitudinalibus latis albis picta, apice subpurpureo , aperturâ albidâ , labii limbo subpurpureo*

Var *b* *Brunnea, strigis obliquè longitudinalibus albis creberrimis fucata, fasciâ basali latâ obscurâ, labii limbo subpurpureo*

In this variety the broad white stripes of the body-whorl are so frequent that they run into each other, leaving only brown interstices here and there

Var *c* *Brunneo-nigricans, strigis latis et maculis irregularibus albis rarioribus ornatis, labii limbo subpurpureo*

In this variety, the stripes, so far as they go, are very distinct, but on the last part of the body-whorl they are broken up and interrupted so as to form spots The ground-colour of the body-whorl is very dark chestnut-brown, with a darker, but very obscure, broad basal band

Var *d* *Flavescens strigis albis fucata, fasciâ latâ basali brunneo-nigricante , labii limbo purpureo-nigricante*

Var *e* *Ex albido flavescens seu subvirescens, anfractibus* 2 *ultimis strigis latis albis ornata , anfractu basali lineis transversis basalibus interruptis subobscuris vittato , aperturâ albâ , labii limbo ochraceo-rubro , apice roseo*

Var *f* *Ex albido flavescens seu virescens, anfractu ultimo strigis latis albis interdum subangulatis ornato , fasciâ basali brunneo-lineatâ, latâ , aperturâ albâ , labii limbo vix ochraceo-rubescens*

In this variety hardly any stripes are visible, except upon the body-whorl

Var *g* *Ex albido pallide et obscurè virescens, fasciâ basali lineatâ lata, aperturâ albâ, columella violaceo-subpurpureâ, labii limbo vix pallidissime rubente*

Var *h* *Sordide virescens lineis transversis obscuris vittata, fasciâ basali sordide brunneâ latâ, aperturâ albâ, columellâ violascente, labii limbo pallide rubente*

Var *i* *Cinerascens, fasciâ basali latâ, lineata brunneâ, aperturâ sordidè alba, labii limbo brunneo nigricante*

The ground-colour beneath the epidermis is rich brown, which is exposed where the epidermis is abraded

Habitant varietates a b c d e, f, g, h et *i*, in insulâ Ticao

Legit H Cuming in sylvis

Var *k* *Grandior, ex albido cinerascens lineis transversis obscure brunneis cincta, fasciâ basali lineato-vittatâ brunnea lata, apertura albida, labii limbo purpurascente*

In this variety the ground colour is brown the riband like broad basal band is dark brown

Var *l* *Productior, e brunneo cinerascens vittis brunneo-nigricantibus cincta, fasciâ basali latâ brunneo nigricante, apertura obscure purpurascente, labii limbo nigricante*

The ground-colour of this variety is brown which becomes deeper on the lower whorls and is exposed where the epidermis is abraded

Habitant varietates k et *l*, in insulâ Masbate

Legit H Cuming in sylvis

In none of the varieties do the markings appear before the third whorl, and in several only on the two last

This species varies in size from about 2¾ inches long by 2 broad, to 1⅝ inch long by 1½ inch broad (W J B)

BULINUS GUIMARASENSIS *Bul testa obovatâ, nitidè glabrâ, anfractibus 5 subventricosis, lineis incrementi oblique longitudinalibus striatâ, apertura et labii limbo albis*

Var *a* *Ex-albido subvirescens, fasciâ basali obscuriore, apice subroseo*

Var *b* *Anfractibus superioribus, fasciâ suturali ultimo fasciâ subbasali castaneo cinctis, apice castaneo roseo*

This species is nearly allied to *Bulinus citrinus*, but differs from it in many points *B Guimarasensis* is without transverse striæ and the whorls are comparatively ventricose In *B citrinus* all the striped varieties which I have seen are marked longitudinally

The var *b* of *Bul Guimarasensis* has a narrow chestnut transverse line very near the suture of the body whorl the base of which body-whorl below the transverse band, becomes greenish A brown stripe adjoins and borders the columella

Var *α* is 2⅛ inches long by 1⅛ inch broad

Var *β* is less

Hab in insula Guimaras

Legit H Cuming in sylvis (W J B)

Bulinus camelopardalis *Bul testâ productâ, gracili, subpupiformi, subdiaphanâ, anfractibus 6 haud ventricosis, ultimo cæteris longiore, aperturâ subovatâ, mediocri, lineis incrementi creberrimè substriatâ, ex albido flavescente, strigis fulvis, distinctis sublongitudinalibus ornatâ, aperturâ albidâ, labii limbo nigro-castaneo*

Long 2 poll circiter, lat $\frac{7}{8}$ poll

Hab ad Sibonga in insula Zeba

Legit H Cuming dumis adhærentes (W J B)

Bulinus Diana *Bul testâ valde productâ subdiaphanâ, anfractibus 7 haud ventricosis ultimo cæteros interdum haud æquante, pallidè flavâ strigis albidis creberrimis fucatâ, aperturâ et apice albis*

Var *a* long $2\frac{1}{8}$, lat 1 poll

Var *b* *Flava haud strigata, aperturâ et apice albis*

Legit H Cuming

The first variety was found by Mr Cuming on the leaves of bushes at Tanhay in the isle of Negros

The second or unstriped variety was taken by him in the island of Siquijor on leaves of trees Among the latter, some faintly-striped individuals show the transition from one variety to the other The young of the striped variety have stripes, but the young of the unstriped variety are of a uniform pale yellow (W J B)

Bulinus Calista *Bul testâ diaphana, anfractibus 7 subventricosis pallide flavâ albido strigatâ, apice subroseo vel roseo-castaneo, labii limbo castaneo-purpurascente*

Var *a* long $2\frac{1}{8}$ lat $1\frac{1}{8}$ poll

Intervals in the whitish epidermis leave the yellow ground-colour in sufficiently well-defined longitudinal irregular stripes, which are often zigzagged Found on bushes

Var *b* *Gracilior, nana* Long $1\frac{7}{8}$, lat $\frac{5}{8}$ poll

The shell of this variety is rather thicker Among them some occur with the lip barely tinged with ochraceous red and a white apex Found on the leaves of trees

Var *c* *Flava, apice roseo, labii limbo castaneo*

Long 2, lat $1\frac{1}{12}$ poll

Found on the leaves of bushes Some have an obscure narrow transverse band on the body-whorl

Var *d* *Subflava, epidermide albo-cinerascente, fasciâ basali nitidè flavâ; apice et labii limbo albis*

Long $1\frac{7}{8}$, lat $1\frac{1}{8}$ poll

Found on the leaves of bushes Among these some occur which still retain the coloured lip and tinged apex In the very young state the shell is perfectly transparent

Hab ad Tanhay in insulâ Negros

Legit H Cuming

The last variety bears a strong resemblance to *Bulinus Diana*, nor should I be at all surprised to see some intervening varieties that

would lead to the conclusion that *Bulimi Diana* and *Calista* belong to the same species. (W. J. B.)

Bulinus Calypso. *Bul. testâ diaphanâ, subventricosâ, subpyramidali, anfractibus 5, lineis incrementi levissime striatis, columellâ subangulatâ, albidâ, tæniis virescentibus cinctâ, apice et labii limbo roseo-purpurascentibus.*

Long. $1\frac{1}{2}$, lat. $\frac{7}{8}$ poll.

Hab. ad Tanhay insulæ Negros.

Legit H. Cuming in sylvis.

A dark rosy-purplish stripe borders the columella, which is itself tinged with red. I have seen but two specimens, one with an injured lip, and in that the columella is not subangulated as it is in the more perfect one. (W. J. B.)

Bulinus Dactylus. *Bul. testâ valde productâ, attenuatâ, anfractibus 7, ultimo cæteros æquante, brunneâ, epidermide cinerascente, aperturâ ovatâ, carneâ vel albidâ, labii limbo castaneo-purpurascente.*

Long. $2\frac{7}{8}$, lat. $1\frac{1}{8}$ poll.

Hab. in montibus Tayabas insulæ Luzoniæ.

Legit H. Cuming foliis arborum adhærentes.

Through the ashy epidermis the brown ground colour appears in most of the specimens in the shape of obscure longitudinal stripes; in very old specimens scarcely any striping is apparent. The brown ground colour is well shown near the aperture, where the attrition of the animal has exposed it. Very old shells are all but opake; younger ones are subdiaphanous. There is in all that I have seen an obscure brown fillet towards the base of the body-whorl. (W. J. B.)

Bulinus Boholensis. *Bul. testâ elongata, graciliore, subdiaphanâ, anfractibus 6, lineis incrementi oblique striatis, ochraceo-cinerascente, strigis longitudinalibus angulatis distinctis ornata, labii limbo castaneo nigricante.*

Var. *a.* *Gracilis, strigis valdè distinctis, anfractuum parte superiore suturam juxta castaneo-nigricante punctata.*

Long. $1\frac{5}{8}$, lat. $\frac{7}{8}$ poll.

Hab. ad Loon insulæ Bohol.

Var. *b.* *Gracilior, strigis creberrimis valdè angulatis.*

Long. $1\frac{4}{8}$, lat. $\frac{6}{8}$ poll.

Hab. cum præcedente.

Var. *c.* *Ventricosior, strigis valdè distinctis, subangulatis.*

Long. $1\frac{6}{8}$, lat. 1 poll.

Hab. ad Loboc insulæ Bohol.

Var. *d.* *Strigis rarioribus obscurioribus.*

Long. $1\frac{7}{8}$, lat. $\frac{5}{8}$ poll.

Hab. ad Baclayon insulæ Bohol.

Legit H. Cuming arborum foliis adhærentes.

The brown ground-colour appearing through the ochraceous-cinerascent epidermis produces the stripes of this elegant shell. A small portion only of the ground-colour is exposed by the attrition of the animal near the mouth of the shell, which is whitish or bluish-white, bordered with the dark chestnut of the lip (W J B)

BULINUS BULLULA *Bul testâ ovato rotundatâ, diaphanâ, albidâ anfractibus* 4 *ventricosis, lineis incrementi obliquè striatis, aperturâ magnâ, subumbilicata*
Long $1\frac{1}{8}$ lat 1 poll
Hab in insula Mindoro
Legit H Cuming
A milk-white line runs round the sutures (W J B)

Mr Gould resumed the exhibition of his new species of Australian birds, and characterized the following species —

EPHTHIANURA TRICOLOR *Ephth vertice, pectore, tectricibusque caudæ coccineis, gutture albo*

Male —Crown of the head upper tail coverts breast and abdomen bright scarlet, lores, line above and beneath the eye ear-coverts occiput and back dark brown, wings brown, each feather margined with brownish white, tail dark brown each feather having a large spot of white on the inner web at the tip chin, throat and under tail coverts white, irides straw-white, bill and feet blackish brown

Female similar in colour, but having only a slight wash of the scarlet colouring except on the upper tail-coverts, where it is as brilliant as in the male

Total length, $3\frac{1}{4}$ inches, bill, $\frac{9}{16}$, wing, $2\frac{3}{4}$, tail, $1\frac{1}{2}$, tarsi, $\frac{3}{4}$
Hab —— ?

MYZANTHA OBSCURA *Myz fronte flavescente-olivaceo, gutture uropygio, et corpore subtùs cinereis,—plumis pectoralibus lunula apicem versus notatis et ad apicem pallide cinereis*

Forehead yellowish olive lores, line beneath the eye and ear-coverts black head and all the upper surface dull grey, with an indistinct line of brown down the centre of each feather, giving the whole a mottled appearance, wings and tail brown margined at the base of the external webs with wax-yellow, the tail terminating in white, throat and under surface dull grey, becoming lighter on the lower part of the abdomen and under tail-coverts the feathers of the breast with a crescent-shaped mark of light brown near the extremity, and tipped with light grey irides dark brown, bare skin round the eye, bill, and bare patch on each side of the throat, bright yellow legs and feet dull reddish-yellow, claws dark brown

Total length, $9\frac{1}{2}$ inches, bill $1\frac{1}{4}$, wing, $5\frac{1}{2}$, tail, $4\frac{5}{8}$ tarsi $1\frac{1}{8}$
Hab Western Australia

PTILOTIS SONORUS *Ptil loris et strigâ per oculos ductâ, ad colli latera, nigris plumis auricularibus flavis —et ponè has, notâ sordidè albâ,—gutture et abdomine pallidè flavescenti-cinereis fusco-striatis*

Crown of the head and all the upper greyish olive, wings and tail brown, margined on their external webs with greenish yellow, lores, space around the eye and broad line down the sides of the neck black, ear-coverts pale yellow, behind which is an obscure spot of greyish white, throat and under surface pale yellowish grey striated with light brown, irides dark brown, bill black legs and feet greenish grey The female like the male in colour, but smaller in all her dimensions

Total length, $7\frac{1}{2}$ inches, bill, 1, wing $3\frac{3}{4}$, tail, $3\frac{1}{2}$, tarsi, 1

Hab South and Western Australia

PTILOTIS CRATITIUS *Ptil vertice cinereo,—loris, strigâ superoculari et plumis auricularibus nigris —infrà et pone has penicillo angusto et flavo, a rictu per gulæ latera ducta appendice nudo, corneo, ad marginem inferiorem libero, et bellè e gilvo cærulescente*

Crown of the head grey, all the upper surface olive-green wings and tail brown, margined with greenish yellow, lores, a large space surrounding the eye and the ear coverts black, below which is a narrow line of bright yellow, from the gape, down each side of the throat for five-eighths of an inch a naked fleshy appendage free at the lower end of a beautiful lilac colour and very conspicuous in the living bird, anterior to this is a tuft of bright yellow feathers, throat and under surface olive-yellow, irides and eyelash black, bill black feet blackish brown tinged with olive

The female is similar to the male but smaller

Total length, 7 inches, bill, $\frac{7}{8}$, wing $2\frac{1}{2}$ tail $3\frac{1}{2}$ tarsi, $\frac{7}{8}$

Hab Interior of South Australia and Kangaroo Island

GLYCIPHILA ALBIFRONS *Glyc facie albâ, gutture nigro, albo minutè adsperso, vertice nigro, plumis albo angustè marginatis*

Forehead lores and a narrow ring round the eye and a narrow line running from the angle of the lower mandible white crown of the head black each feather slightly margined with white ear-coverts silvery blackish gray behind which an irregular line of white, all the upper surface brown, irregularly margined with white, producing a mottled appearance wings and tails brown the primaries margined externally with yellowish green, chin and throat brownish black, the former minutely speckled with white, under surface of the wing buff chest and abdomen white, striped with blackish brown on the flanks, irides dark brown, bill black, feet blackish brown

The female is like the male in plumage but smaller in size

Total length, $5\frac{3}{4}$ inches, bill, $\frac{3}{4}$, wing, $3\frac{1}{4}$ tail, $2\frac{3}{4}$, tarsi, $\frac{7}{8}$

Hab Western Australia

MELIPHAGA MYSTACALIS *Mel vertice et gutture nigris, strigâ superoculari angustâ, albâ, plumis auricularibus densis albis, et penicillum posticè acutum efficientibus*

Head, chin and throat black, over the eye a narrow line of white, ears covered by a conspicuous tuft of white feathers, which are closely set and terminate in a point towards the back, upper surface brownish black, the feathers edged with white, under surface white with a broad stripe of black down the centre of each feather, wings and tail blackish brown, conspicuously margined with bright yellow, irides brown, bill black, feet blackish brown

Total length, 6½ inches, bill, 1 wing, 3 tail, 2¾, tarsi,
Hab Western Australia
Nearly allied to *Meliphaga sericea*

Pʟᴀᴛʏᴄᴇʀᴄᴜs Aᴅᴇʟᴀɪᴅæ *Plat vertice, pectore, abdomine medio, crissoque coccineis, lateribus viridescenti-flavis, uropygio sordidè olivaceo-flavo*

Fully adult male —Crown of the head, lores, sides of the neck, breast and all the under surface scarlet, passing into pale greenish yellow on the flanks, cheeks and wing-coverts light lazuline blue primaries deep blue passing into black at the extremity back of the neck yellowish buff, back black each feather broadly margined with greenish yellow, some of these margin ations tinged with blue others with scarlet, rump and upper tail coverts dull greenish yellow, the latter tinged with scarlet two centre tail feathers greenish blue the remainder deep blue at the base gradually becoming lighter until almost white at the tip, irides brown bill horn-colour, feet grayish brown

Total length, 13½ inches, wing, 7, tail 8, tarsi ¾

Hab South Australia

This species is subject to great change from youth to maturity during the first few months it is almost wholly green and this gradually gives place to scarlet on the head, rump, under surface and the margins of the back-feathers

Aǫᴜɪʟᴀ ᴍᴏʀᴘʜɴᴏɪᴅᴇs *Aq capite cristâ suboccipitali brevi ornato, facie nigrescente corpore subtùs rufo plumis et pectoris et abdominis strigâ centrali nigrâ notatis*

Face crown and throat blackish brown, tinged with rufous giving it a striated appearance bounded in front above the nostrils with whitish, feathers at the back of the head which are lengthened into a short occipital crest back of the head, back, and sides of the neck, all the under surface thighs and under tail coverts rufous, all but the thighs and under tail-coverts with a stripe of black down the centre of each feather, back rump and wings brown, the centre of the wing lighter, primaries brownish black, becoming darker at the tip, and barred throughout with grayish buff which is conspicuous on the under surface, but scarcely perceptible on the upper, except at the base of the inner webs under surface of the wing mottled with reddish brown and black, tail mottled grayish brown, crossed by seven or eight distinct bars of blackish brown, the tips being lighter, cere and bill lead-colour passing into black at the tip, eye reddish hazel surrounded by a narrow blackish brown eyelash, feet and toes very light lead colour

Total length, 21½ inches, bill, 1¾, wing, 15, tail, 9½, tarsi 2¾

This species is very robust, and although but a small bird is in every respect a true *Aquila* It is nearly allied to but much stouter than *Aquila pennata*

Hab Yarrundi on the Upper Hunter, New South Wales

Bᴜᴛᴇᴏ ᴍᴇʟᴀɴᴏsᴛᴇʀɴᴏɴ *B. rostro grandi, et elongato gulâ, pec-*

tore et abdomine nigris, primariis ad basin subtùs albis, caudâ cinereâ

Crown of the head face chin, chest and centre of the abdomen deep black, passing into chestnut-red on the flanks, thighs and under tail coverts, back of the head chestnut-red becoming black in the centre of each feather, shoulders whitish buff, all the upper surface deep brownish black margined with chestnut-red, primaries white at the base, deep black for the remainder of their length, cere and base of the bill purplish flesh-colour passing into black at the tip irides wood-brown feet white tinged with lilac

Total length, 22 inches, bill, 2½ wing 19½ tail, 8½, tarsi, 2⅝

This species is nearly allied to the Red-tailed Hawk of North America and the *Buteo Jackal* of South Africa, but from both of these it may be distinguished by the jet-black colouring and by its more lengthened bill During flight the white at the base of the primaries is very conspicuous, and is strikingly contrasted with the black of the chest and the brown of the other part of the wings

Hab Interior of New South Wales

Falco hypoleucos *Fal corpore superne cinereo-fusco singulis plumis margine dilutiore cinctis corpore subtùs albo, plumis strigâ fuscâ apud apicem in maculam latam desinente, ornatis*

Head and all the upper surface grayish brown the feathers of the head having a fine stripe of black down the centre the remainder dark brown in the centre, chin and all the under surface white with a fine line of black down the centre, passing into a spatulate form near the tip, outer webs and tips of the primaries brownish black the extreme ends being whitish, their inner webs whitish crossed by numerous narrow bars, fading into a point as they approach the edge, tail gray obscurely barred with brown, and tipped with buff

Total length 17 inches bill 1¼ wing, 12½, tail, 7½, tarsi, 1¾

Considerably smaller, but closely allied to the Jerfalcon, *Falco Islandicus*

Hab Western Australia

Podargus brachypterus or macrorhynchus *Pod rostro prægrandi (ad magnitudinem corporis ratione habitâ) et producto, colore corporis obscuro et minutè punctulato*

Crown of the head and all the upper surface finely freckled gray and brown, with a stripe of black down the centre of each feather, the light colour predominating on the scapularies, feathers between the eyes and the nostrils chestnut-brown, sprinkled with black and tipped with white, shoulders and lesser wing-coverts deep reddish brown, some of the feathers tipped with a white spot, freckled with red in the centre, greater coverts and secondaries mingled gray and reddish brown, the former tipped like the lesser coverts, primaries reddish brown, regularly barred with buffy-white on their outer webs and with interrupted tawny bands on their inner webs, tail light-brown, freckled with black and gray and crossed by numerous irregular, narrow, dark-brown bands freckled with gray, all the under surface grayish white, each feather crossed by numerous fine and irregular bars of tawny and with a stripe of brown down the centre, the latter colour becoming chestnut and forming a semilunar mark down each side of the neck, thighs black, irides light yellow, bill and feet brown

Total length 15 inches, bill, 25, wing, 9, tail, 7, tarsi, $1\frac{1}{8}$

In its general appearance this bird closely resembles the *Podargus humeralis* but is even smaller in size than *P Cuvieri*, while at the same time the bill is fully equal in size to that of the former species, it also projects much farther from the face than in any other species inhabiting Australia

Hab Swan River, Western Australia

MALURUS MELANOTUS *Mal vertice gulâ, abdomine, humeris caudæque tectricibus lazulino-cæruleis, loris, nuchâ vittâ pectorali et dorso imo nigris*

Male —Crown of the head, crescent shaped mark on the back, upper tail-coverts throat and under surface rich metallic lazuline blue, ear-coverts metallic verditer-blue lores, collar round the back of the neck line from the base of the lower mandible down the sides of the neck, band across the breast and lower part of the back jet-black, wings brown margined with pale green, tail greenish blue tipped with grayish white, irides, bill and feet black

Female —Lores rufous head and all the upper surface rufous brown, all the under surface brownish white, tail bluish green, tipped with grayish white, bill rufous irides blackish brown, feet brown

Total length, $4\frac{3}{4}$ inches, bill, $\frac{1}{2}$, wing, 2, tail, $2\frac{1}{2}$, tarsi, $\frac{7}{8}$

This beautiful species may be distinguished from the *Malurus pectoralis* by its rather smaller size, and by the black band across the back

Hab Western belts of the Murray in Western Australia

COLLURICINCLA BRUNNEA *Coll corpore supernè fusco, sic et corpore subtùs at colore multo dilutiore, rostro nigro*

All the upper surface pale brown, primaries and tail the same, but somewhat lighter, all the under surface brownish white, becoming almost pure white on the vent and under tail coverts, thighs grayish brown bill black feet blackish brown

Total length, $9\frac{1}{2}$ inches, bill, $1\frac{1}{8}$, wing, $4\frac{3}{4}$, tail, $4\frac{1}{4}$, tarsi, $1\frac{1}{4}$

The sexes are alike in plumage

This species rather exceeds in size the *Colluricincla cinerea*, Vig and Horsf, and has a more curved, longer and stouter bill

Hab The north-west coast of Australia

COLLURICINCLA RUFIVENTRIS *Coll corpore supernè intensè cinereo, olivaceo leviter tincto, abdomine imo, crissoque rufis*

Lores grayish white, crown of the head and all the upper surface deep gray, slightly tinged with olive, primaries and tail dark brown, margined with brownish gray, throat and under surface darkish gray passing into buff on the vent and under tail-coverts, all the feathers of the under surface have a narrow dark line down the centre, thighs gray, irides dark brown, bill black, feet dark brown

Total length $8\frac{1}{2}$ inches bill, 1, wing, 5, tail, $4\frac{1}{4}$, tarsi $1\frac{1}{4}$

The sexes are alike in colour

About the size of *Colluricincla cinerea*, Vig and Horsf, from which it may be distinguished by the uniform colouring of the back and the buffy tint of the lower part of the abdomen and under tail-coverts

Hab Swan River, Western Australia

PACHYCEPHALA RUFOGULARIS *Pach mas corpore supernè fuscescenti-cinereo, gulâ et corpore subtùs rufis, pectore vittâ fuscescenti-cinereâ obscurè notatâ*

Fœm a mare differt corpore subtus albescenti-cinereo haud rufo

Male —Crown of the head and all the upper surface deep brownish gray wings and tail dark brown the feathers margined with grayish brown, lores chin, throat under surface of the shoulder and all the under surface reddish sandy brown crossed on the breast by a broad irregular band of grayish brown irides reddish brown, bill black feet blackish brown

Female —Differs from the male in having the throat and under surface grayish white, the chest being crossed by an obscure mark of grayish brown and with a line down the centre of each feather

Total length, 7 inches, bill, $\frac{3}{4}$, wing $4\frac{1}{4}$, tail, $3\frac{1}{2}$, tarsi 1

This species is somewhat allied to *P pectoralis*, but may be distinguished from it by the rufous colouring of the throat, and by the band across the chest being grayish brown instead of black

Hab South Australia

PACHYCEPHALA INORNATA *Pach olivaceo-fusca, abdomine pallidiore, plumis corporis inferioris strigâ fuscâ centrali leviter notatis*

All the upper surface grayish olive, wings and tail brown, the feathers of the former broadly margined with lighter brown all the under surface brownish gray, becoming nearly white on the vent and under tail-coverts, with a fine stripe of pale brown down each feather, irides dark brown, bill blackish brown, fleshy towards the base, feet blackish brown

Total length, 7 inches, bill, $\frac{3}{4}$, wing $3\frac{3}{4}$, tail, $3\frac{1}{2}$ tarsi, 1

This bird has somewhat the appearance of the young or female of *P gutturalis* but its larger size and shorter and more robust bill distinguish it from that species

Hab Belts of the Murray in South Australia

ZOSTEROPS CHLORONOTUS *Zos dorso olivaceo-viridi, gutture et crisso virescenti-flavis*

Lores black crown of the head and all the upper surface olive-green, primaries and tail feathers brown, margined with olive-green, throat and under tail-coverts light greenish yellow breast and under surface gray, tinged with brown on the abdomen and flanks, irides wood-brown, bill brown, lighter on the under mandible, legs and feet dark-gray

Total length, $4\frac{1}{4}$ inches bill, $\frac{9}{16}$, wing $2\frac{1}{8}$, tail $1\frac{3}{4}$ tarsi, $\frac{5}{8}$

Hab Western Australia

December 8 —W H Lloyd, Esq , in the Chair

A paper by G B Sowerby Esq , was read, in which the author continues his descriptions of the new shells collected in the Philippine Islands by H Cuming, Esq

Helix Monticula *Hel testa suborbiculari, subconicâ, tenui pallescente, lævi spira brevi, subpyramidali, obtusa, anfractibus quatuor tenerrimè (lineis incrementi) striatis, depressiusculis ultimo magno obtusissimè angulato antice depressiusculo viridi, aperturâ subtrapeziformi ungulis posticis acutiusculis, peritremate angusto, tenuiter reflexo, albo, columella alba*

Long 0 9, lat 0 9 poll

Hab supra foliis arborum apud Lallo provinciæ Cagayan insulæ Luzon, Philippinarum

All the varieties of this pretty species are green in front and the *apex* appears to be always colourless The following six varieties occur —

a Yellow above, circumference orange-yellow, front green From Lallo

b Yellow above, circumference orange-yellow with a dark brown slightly interrupted band, green in front From St Jaun in the province of Cagayan

c Yellowish white above, with a narrow dull yellowish green circumferential band, green in front From Gattaring, in the province of Cagayan

d Volutions banded in the following order band next to the suture yellowish white, then a pale green broader band, then a yellowish white band then a dark brown circumferential band, with jagged edges then another yellowish white band, and then green in front From Lallo

e Small, pale yellowish, with a light band, consisting of short dark brown lines near to the suture, a dark brown circumferential band, front dull yellowish green From St Jaun

f Antesutural band consisting of irregular dark brown lines arranged side by side, then a yellowish white band, then a broad, dark brown somewhat mottled and interrupted band, then another yellowish white band, and then the green front From Abulug in the province of Cagayan

Helix Coccomelos *Hel testa subglobosâ, tenuiusculâ, lævi, anfractibus quatuor rotundatis, lævigatis striis incrementi solum insculptis ultimo maximo, apertura suborbiculari, peritremate reflexo, labio columellari albo, declivi, obtuso, depressiusculo*

Long 1 3, lat 1 4 poll

Hab supra foliis arborum ad insulam Tablas dictam Philippinarum

In general this species bears a great resemblance to a plum, for which reason I have called it *H Coccomelos* Several varieties may be distinguished

a *Apex* dark brownish red, softened off gradually to a pale yellow-green which becomes gradually darker, until the body of the last volution is of a fine dark green lip white

b Similar to *a*, only dark brown instead of green *c* Of a uniform very dark chocolate-brown, except the second and third volutions, which have a rather paler central band lip chocolate

d *Apex* dark chocolate-brown upper part of the spire of a pale dull yellowish colour, becoming darker and greener toward the last volution where the ground-colour is olive-green, an antesutural dark red-brown broad band, a circumferential band of a rather darker colour but rather narrower, and the columellar lip surrounded by a broad dark band, which is softened off into the dark olive-green ground-colour

e Of an uniform pale yellow-brown, becoming very dark near the back of the lip where it is nearly black lip chocolate From Calbayog island of Samar found on leaves of trees

f Similar to *e* but having two narrow dark brown bands lip nearly black behind, white in front From Calbayog

HELIX INTORTA *Hel testa suborbiculari subdepressa tenui lævi anfractibus* $4\frac{1}{2}$ *ventricosis tenuissime striatis plerumque pallescente flavidis fasciis tribus castaneis ornatis apertura sublunari peritremate tenui tenuiter reflexo, labio columellari rectiusculo extùs inclinato, obtuso*

Long 1, lat 1 5 poll

Hab Supra folius fruticum ad Loboc insulæ Bohol, Philippinarum

Several varieties of this beautiful species occur most of them are marked with two brown bands and have the circumference of the *columella* of the same colour one is of an uniform pale brownish colour and another is almost entirely of a very dark chocolate colour a white line may be observed close to the suture in most of the varieties The following are the most distinct varieties —

a Ground colour pale yellowish antesutural band very dark chestnut-brown, circumferential band of the same colour and a broad band of the same surrounding the *columella* From Loboc

b Similar to *a* but considerably larger, and having a broader circumferential band From Loboc

c Ground-colour of a pale brown hue bands the same as in *a*

d Smaller than *a* ground-colour pale greenish brown, bands nearly the same, but very dark and brilliant From Loboc

e Ground-colour pale yellowish brown, antesutural band softened off in front, in other respects like *a*

f Ground-colour pale yellowish, bands pale chestnut-brown From Loboc

g Ground-colour pale yellow, bands increasing in width toward the back of the mouth where they unite and where the brown colour extends from front to back of the shell the peritreme is entirely white, and the circumference of the *columella* also Found on leaves of trees on the island of Siquijor

h Ground colour very pale yellowish antesutural band very narrow and indistinct, circumferential band broad pale and rather irregular, lip and circumference of the *columella* white From the island of Siquijor

i Shell entirely of a pale lemon yellow except only a narrow antesutural dark brown band which becomes broader towards the lip Found on leaves of bushes at Tanhay, in the Isle of Negros

k Ground-colour very pale yellow-brown, a brown circumferential band, which is only perceptible on the latter half of the last volution From Loboc

l Shell of an uniform pale brownish colour From Loboc

m *Apex* reddish-brown upper part of the shell pale yellowish brown, increasing rapidly in intensity so that nearly the whole of the last volution is of a dark chocolate-brown, *columella* white, lip nearly black From Loboc

MICROSCOPICAL SOCIETY

At a meeting of the Microscopical Society held July 21st J S Bowerbank Esq in the Chair, a paper was read from the Rev J B Reade, M A, F R S, on the process of charring vegetable tissue, as applied to the examination of the stomata in the epidermis of Garden Rhubarb The author, after mentioning the great advantages derivable from charring objects for the microscope, which he first suggested goes on to state that it is peculiarly advantageous for exhibiting delicate membranes, which cannot from their transparency be well seen by the ordinary method of viewing objects, in water between glasses It having long been a disputed point with botanists, whether the stomata in plants were open or closed by a membrane, the author was led to examine the subject and for this purpose took the cuticle of the common garden rhubarb, which was obtained by macerating the sheaths investing the flower-stalks for a few days in water and then charring it, from his observations he arrives at the following conclusions That the application of the process of charring proves beyond a doubt, that the stomata in this tissue of the rhubarb are distinct openings into the hollow chambers of the parenchyma of the leaf, that the perforation is the rule and not the exception in the structure, and that the exception where it exists, *i e* where the stomata are closed, proves the existence of the overlying membrane discovered and described by Dr Brown Some discussion then followed, in which Messrs Gray, Lindley, and Quekett took a part

MISCELLANEOUS

Analogies of European and Indian Geology —" Notwithstanding the difficulty of establishing the identity in remote quarters of the world, of rocks so vaguely characterized as the saliferous marls, yet when we have coal measures affording a certain fixed point, or landmark to guide us we cannot be very far out in fixing upon the green marls, or often friable sandstone, which extend along the lower ridges of many parts of the great Himalayan chain, immediately adjoining the plains of Hindostan, as the Indian equivalent of the beds in question Along the southern side of Assam we have the same rocks as well as brine-springs, and an earthy limestone, probably equivalent to the English lias On the face of the Cherra mountain the green marl rests unconformably on old red sandstone (or that on which the coal formation rests), and gives support to the deposits of sand in which the marine remains are contained It is here by no means destitute of fossils as in other localities, on the contrary, we found in it six species of univalve shells, a small species of *Echinus* and a large spined *Cidaris* In a note which we made on the characters of a fragment of rock brought away from a submerged reef near Arracan, by the hull of a ship which struck upon it we pointed out the resemblance between its appearance and that of the green conglomerates in question*

' A description of the salt formations at the head of the Indus, and their relative position to the coal measures recently found there by Mr Jameson will be the means of casting much important light on this subject in regard to India, and we have fortunately in the gentleman alluded to a geologist near the spot, fully alive to the importance of this and other questions of a similar nature Another equally important question is the situation of the great repositories of salt in the vicinity of Ajmeer and other situations in Central India, where salt lakes abound Lieut Fraser, of the Engineers we recollect, sent us a fragment of rock-salt which was found imbedded in a basaltic rock when sinking a well at Mhow, about three feet from the surface We have not heard that this curious fact has led to any further discovery or research in the neighbourhood alluded to

' It would be extremely important if we could establish good distinguishing characters between the limestone of the coal-measures and that of the more ancient formations but this if a matter of difficulty in England, is at least an equally difficult thing in India It is true, the subject has here been as yet little investigated but we cannot place the least confidence in those practical men who employ names without thinking of their meaning, and speak confidently of lias, and carboniferous limestone, primitive limestone &c, according as they happen to suppose any particular specimen they meet with in India to be one or other The limestone so abundant in Kemaon, as to form the greater portion of that mountainous district, is so much like the limestone of the coal-measures at Cherra Ponji, that no one unacquainted with the peculiar relations of the two rocks would suppose them to be at all different The geologist however, perceives the vast difference between them at once the one reposes on clay-slate, the other on sandstone, the one occurs in thick continuous beds, the other alternates with shale, the one abounds in fossils, which scientific men alone would think of looking for and in the other the geologist alone would know that he might look for fossils in vain. Speaking of the difference between the limestone of the Silurian system and that of Coalbrook dale, Mr Murchison says, that the organic remains, which are in great profusion in the latter, consist of shells and corals which are characteristic of the carboniferous limestone in many other parts of Great Britain, and *never* occur in the inferior limestones of the Silurian system Among these the most prominent are the large *Productus hemisphericus*, and many corals including *Lithodendron sexdecimale* (*Clodocora* of Ehrenberg), which is so abundant that it constitutes the greater part of the layers of black calcareous shale which divide the beds of limestone The black limestone in which these remains are found is overlaid by a sandstone which separates it from the productive coal-beds, and is underlaid by strata belonging to the lower limestone

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* Journ Beng As Soc 1838, p 936

Mr Murchison particularly alludes to a specimen of *Lithosortion floriforme*, a species of coral two feet five inches broad by one and a half high, which appeared in a quarry to retain the original position in which it grew, and conveyed the impression that it had remained undisturbed beneath the sea while fine red sand at one time and mud at another were deposited around it

' These corals are also found in the limestone of the Cherra Ponji coal-measures, and in a large heap of limestone collected by Mr Inglis of Chattack for the purpose of burning for lime I found the first fossil I had observed in a similar rock in India, thus indicating the presence of a coal district The object of the journey would not, however admit of my visiting the quarry, but there can be no question that the rock alluded to is connected with the numerous indications of coal formations that have been found in that vicinity One other corresponding character may be mentioned between the Cherra Ponji coal-beds and those of Coalbrook dale, namely, that the coal-measures do not graduate downwards into the older rocks The limestone of Cherra, which alternates with beds of sandstone and shale seems to rest immediately on the old red sandstone, as in the Coalbrook dale beds Mr Murchison observes, that the carboniferous limestone has not in Coalbrook dale any regular downward passage into the old red sandstone, as in other districts, on the contrary, the old red terminates at the southern end of the tract and has never been found beneath the coal-measures On the north bank of the Severn the underlying stratified rocks throughout the productive coal-field consists of various members of the Silurian system

" Mr Murchison concludes his observations on this coal-field by a notice of the faults and dislocations occasioned by trap rocks The district affords proofs of having been raised up from beneath the surrounding new red sandstone in separate wedge shaped tracts, the most remarkable dislocation being that which bounds the coal-field to the east The coal-measures along this line are not less than 1000 feet thick, and as some of the lower seams of coal are thrown up to the level of the overlying strata of new red sandstone, the upcast is thus shown to have exceeded 1000 feet, though to what further extent has not yet been ascertained It will be recollected that we formerly explained the elevated position of the Cherra coal-measures in precisely the same way that Mr Prestwich and Mr Murchison now account for the great upcast of the Coalbrook dale field*, the only difference in the two cases being, that in India the dislocation is not confined to the coal-measures, but extends to the old red sandstone the whole series of which, with the coal-measures reposing on them, having been at Cherra Ponji thrown 3000 feet above those which have been recently found by Major Lister and others at the bottom of the same mountains It is of much importance to draw comparisons between geological phænomena of this nature in remote parts of the earth, as tending not only to put our theories to the test, but also to correct and give confidence to our views, which however complicated they may appear when derived from a narrow field of observation become gradually simplified and important in proportion as our data become general —*M Clelland's Calcutta Journal of Natural History*

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* See Report of a Committee for investigating the Coal and Mineral Resources of India Calcutta, 1838, p 24

Suggestions for Experiments on the Conservation of Vegetative Powers in Seeds, circulated by a Committee of the British Association —These experiments are intended to determine the following questions —

1 What is the longest period during which the seeds of any plant under any circumstances can retain their vegetative powers?

2 What is the extent of this period in each of the natural orders, genera and species of plants? and how far is it a *distinctive* character of such groups?

3 How far is the extent of this period dependent on the apparent characters of the seed, such as size, hardness of covering, hardness of internal substance, oiliness, mucilage, &c ?

4 What are the circumstances of situation, temperature, dryness, seclusion from the atmosphere, &c most favourable to the preservation of seeds?

To answer these questions satisfactorily will require the accumulation of a large mass of facts and although there are many difficulties in the way of such an investigation, and many years may elapse before it can be brought to maturity, yet it is desirable that the British Association should commence the collection of materials for the purpose It is proposed then to invite botanists and others to undertake the following series of experiments and to communicate the results to the British Association

These experiments are either Retrospective or Prospective

A RETROSPECTIVE EXPERIMENTS

1 By collecting samples of ancient soils from situations where vegetation cannot now take place, and by exposing these soils to air, light, warmth, and moisture, to ascertain whether any, and if any, what, species of plants spontaneously vegetate in them

> N B —Care must of course be taken that no seeds obtain admittance into these soils from external sources,—such as the air or water introduced to promote vegetation

These ancient soils are either *natural* or *artificial* deposits

The *natural* deposits belong either to *past* geological periods or to the *recent* period

a The deposits of past periods are either secondary or tertiary

> N B —There seems every reason to believe that the age even of the latest of these deposits is far beyond the maximum

period through which vegetative powers can be preserved, yet as many accounts are recorded of seeds vegetating spontaneously in such soils, it would be well to set these statements at rest by actual experiment.

In such experiments, state the formation, and describe the geological phænomena of the locality, together with the depth from the present surface at which the soil was obtained

b Natural deposits of the recent period may be classed as follows —

Alluvions of rivers
Tidal warp land
Shell marl
Peat
Surface-soil buried by landslips
Ditto ditto by volcanic eruptions

In these cases, state the nature of the soil, the depth from the surface, &c , and especially endeavour to obtain an approximate date to each specimen of soil, by comparing its depth from the surface with the present rate of deposition, or by consulting historical records It would be well to submit to experiment a series of samples of soil taken from successive depths at the same locality

c Artificial deposits are as follows —

Ancient tumuli
Ancient encampments
The soil beneath the foundation of buildings
The soil with which graves, wells, mines, or other excavations have been filled up
Ridges of arable land, &c

In these cases, state, as before, the depth from the surface, and ascertain from historical sources the approximate age of the deposit

2 By trying experiments on actual seeds which exist in artificial repositories These are,—

Seeds in old herbaria and botanical museums
Seeds obtained from mummies, funereal urns, at Pompeii, Herculaneum, &c
Dated samples of old seeds from nurserymen and seedsmen

In these cases, state the circumstances in which the seeds have been preserved, and their date as nearly as it can be ascertained

B PROSPECTIVE EXPERIMENTS

In this department of the inquiry, it is proposed to form deposits of various kinds of seeds under different conditions, and to place a portion of them at successive periods under circumstances calculated to excite the process of vegetation In the case of certain species or families of plants, it would perhaps require many centuries to determine the limit of their vegetative powers, yet it is probable that a very few years would suffice to fix the maximum duration of the greater number, and that many interesting results might thus be obtained even by the present generation of botanists It is proposed then to form a collection of the seeds of a great variety of plants, (including, wherever it is possible, at least one species of every genus,) and to pack them up (carefully labelled) either alone, or mixed with various materials, as sand, sawdust, melted wax or tallow, clay, garden mould, &c in various vessels, as glass bottles, porous earthen jars, wooden boxes, metal cases, &c, placed in various situations, as under-ground, in cellars, dry apartments, &c At certain intervals increasing in extent,—say at first every two years, then every five, every ten, and, at the lapse of a century, every twenty years, a small number (say twenty) of each kind of seed, from each combination of circumstances, to be taken out and sown in an appropriate soil and temperature, and an exact register kept of the number of seeds which vegetate compared with those which fail

Should it appear desirable for this project to be carried out by the British Association, they might most effectually accomplish it by committing a collection of seeds, formed on the above plan, to some qualified person, whose duty it should be, in consideration of a small annual stipend, to take charge of them, and at stated periods to select portions for experiment, keeping an accurate register of the results

In this manner it is believed, that in regard to the large majority of plants, the limit of their vegetative durability would be determined in a very few years, and that a large mass of vulgar errors on this subject, which now pass current for facts, would be cancelled and exploded

> N B —The most effectual way of exciting vegetation in seeds of great antiquity, is to sow them in a hot-bed, under glass, and in a light soil moderately watered

METEOROLOGICAL OBSERVATIONS FOR JULY 1841

Chiswick —July 1 Overcast 2 Hazy overcast and fine slight rain 3 Hazy and mild very fine 4, 5 Very fine 6 Rain fine 7 Fine rain 8 Fine clear 9 Very fine 10 Fine rain 11 Overcast 12 Cloudy and mild 13 Cloudy 14 Showery 15 Heavy thunder showers constant heavy rain 16 Cloudy 17, 18 Fine 19 Very fine 20 Heavy rain 21 Overcast rain 22 Cloudy 23 Cloudy and fine 24, 25 Cloudy 26, 27 Light haze fine 28 Cloudy 29 Cold and dry cloudy slight rain 30 Fine but cool 31 Rain cloudy —The quantity of rain which fell on the 15th was unusually great, amounting to nearly an inch and a half in the course of the twenty four hours

Boston —July 1 Rain 2 Cloudy 3 Fine 4 Cloudy rain P M 5 Cloudy 6 Rain and stormy rain early A M rain P M 7 Cloudy rain P M 8 Fine 9 Cloudy rain P M 10 Fine rain early A M 11 Cloudy 12 Fine rain P M 13 Cloudy rain P M 14 Fine 15, 16 Fine rain P M 17 Fine 18 Cloudy rain P M 19 Fine rain P M 20 Rain rainy day 21 Cloudy rain P M 22 Cloudy rain P M with thunder and lightning 23 Cloudy rain P M 24—28 Cloudy 29 Cloudy and stormy rain A M and P M 30 Fine 31 Cloudy thunder and lightning P M

Applegarth Manse, Dumfries-shire —July 1 Fine one shower 2 Fine and fair but cloudy 3 Sunshine and rain 4 Slight showers 5 Rain all day 6 Fair and fine 7 Cloudy A M fine P M 8 Fine one shower 9 The same 10 Wet afternoon 11 Slight showers 12 Slight showers, but heavier 13. Heavy showers thunder 14 Incessant showers 15 Heavy rain till noon 16 Fair and fine 17 Fair but threatening 18 Fair and warm thunder 19 Fine with a few drops 20, 21 Rain P M 22 Slight showers 23 Cloudy but fair 24 Fine all day 25 Remarkably fine 26 Showers. 27 Showers P M 28 One slight shower 29 Fair throughout 30 Fair but threatening 31 Fair with a few drops

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr Roberton, *by* Mr Thompson *at the Garden of the Horticultural Society at Chiswick, near London, by* Mr Veall *at Boston, and by* Mr Dunbar *at Applegarth Manse, Dumfries-shire*

Days of Month 1841 July	Barometer						Thermometer								Wind				Rain				Dew point
	London Roy Soc 9 a m	Chiswick		Boston 8½ a m	Dumfries-shire		London Roy Soc			Chiswick		Boston 8½ a m	Dumfries shire		London Roy Soc 9 a m	Chiswick 1 p m	Bost.	Dum fries shire	London Roy Soc 9 a m	Chiswick	Boston	Dumfries-shire	Lond Roy Soc 9 a m
		Max	Min		9 a m	8½ p m	Fahr 9 a m	Self register Max	Self register Min	Max	Min		Max	Min									
1		30 080	30 049	29 47	29 76	29 84				63	59	62 5	64	51		SW	W	W		05	22		
2		30 123	30 086	29 52	29 98	30 01				69	60	63 5	65	53½		W	calm	E		01	06		
○ 3		30 126	29 989	29 58	29 95	29 82				79	55	67	64	56		SW	calm	SSW		04			
4		29 999	29 963	29 37	29 80	29 95				69	53	66 5	64	55		SW	calm	E.					
5		30 064	29 929	29 55	29 97	29 65				75	57	61	59	48½		NE	calm	SE & S		59	03		
6		29 805	29 635	29 03	29 58	29 68				72	52	60	64	52		W	W	NW		03	1 27		
7		29 885	29 639	29 31	29 65	29 55				67	53	61	59	50		SW	W	W		08	03	0 78	
8		29 898	29 742	29 20	29 63	29 70				67	45	58	60½	47½		W	NW	W		01	16		
9		29 949	29 939	29 44	29 75	29 79				71	44	60	57	45½		W	W	WNW					
10		29 926	29 492	29 44	29 69	29 20				71	49	58	55½	45		SW	calm	SW		36	09		
☾ 11		29 572	29 266	28 77	29 27	29 39				70	43	57 5	59½	47½		NW	calm	NNE			26		
12		29 594	29 578	29 05	29 43	29 46				64	44	58	40	45		W	W	NNE		02			
13		29 719	29 630	29 13	29 49	29 55				68	42	58	59	48		W	calm	NW		02	06		
14		29 726	29 570	29 25	29 56	29 57				66	45	60	57½	50		SW	W	NW		07	04	1 80	
15		29 742	29 646	29 16	29 58	29 71				68	51	60	61	48½		S	calm	NE		1 46			
16		29 977	29 874	29 40	29 86	29 87				72	44	61	61	47½		N	calm	NE		01	03		
17		30 013	29 820	29 53	29 85	29 75				75	49	63	63	40½		S	calm	SSW			17		
● 18		29 742	29 634	29 24	29 68	29 70				75	48	64	67	49		NW	calm	W					
19		29 813	29 795	29 30	29 69	29 65				73	54	62	66	51½		W	calm	SW		07	01		
20		29 699	29 493	29 15	29 49	29 30				63	55	59	64	52		SW	W	ESE		29	09		
21		29 665	29 469	28 92	29 33	29 43				67	54	63 5	64	53		SW	W	NW		10	28	0 49	
22		29 828	29 724	29 16	29 55	29 70				67	51	61	58½	48½		W	W	NNW		22	14		
23		29 999	29 915	29 39	29 82	29 96				64	53	56	62	49		NW	W	E		01	65		
24		30 133	30 085	29 66	30 05	30 08				60	50	55	62	51		NE	NW	NW			02		
☽ 25		30 127	30 071	29 65	30 06	30 00				68	51	58	62	51		NE	calm	W					
26		30·074	30 022	29 56	29 98	29 94				72	53	61	66	51		SW	calm	SW					
27		29 990	29 943	29 45	29 85	29 62				70	49	58 5	55	47		NW	NW	SW					
28		29 839	29 774	29 20	29 53	29 55				72	47	61	60	51½		SW	W	W				0 05	
29		29 760	29 722	29 09	29 46	29 48				65	48	55	58½	48		W	W	W		01			
30		29 695	29 621	29 10	29 49	29 40				63	48	58	56	45½		NW	W	WNW			13		
31		29 622	29 576	29 03	29 35	29 54				62	44	54	60	48½		W	W	NW		11			
Mean		29 877	29 764	29 29	29 681	29 682				68 61	50 00	60	61	49 1						3 56	3·74	3 32	

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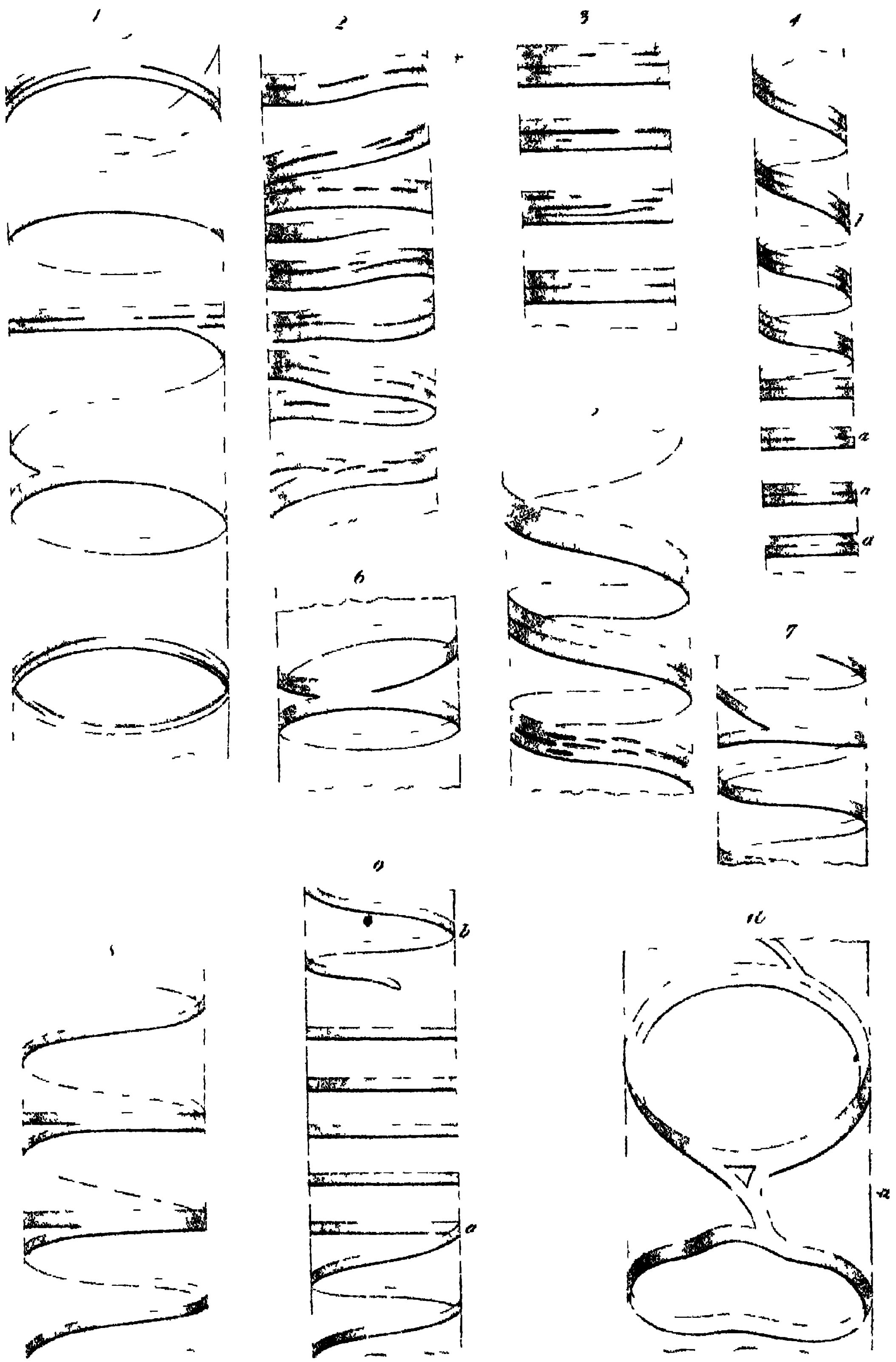
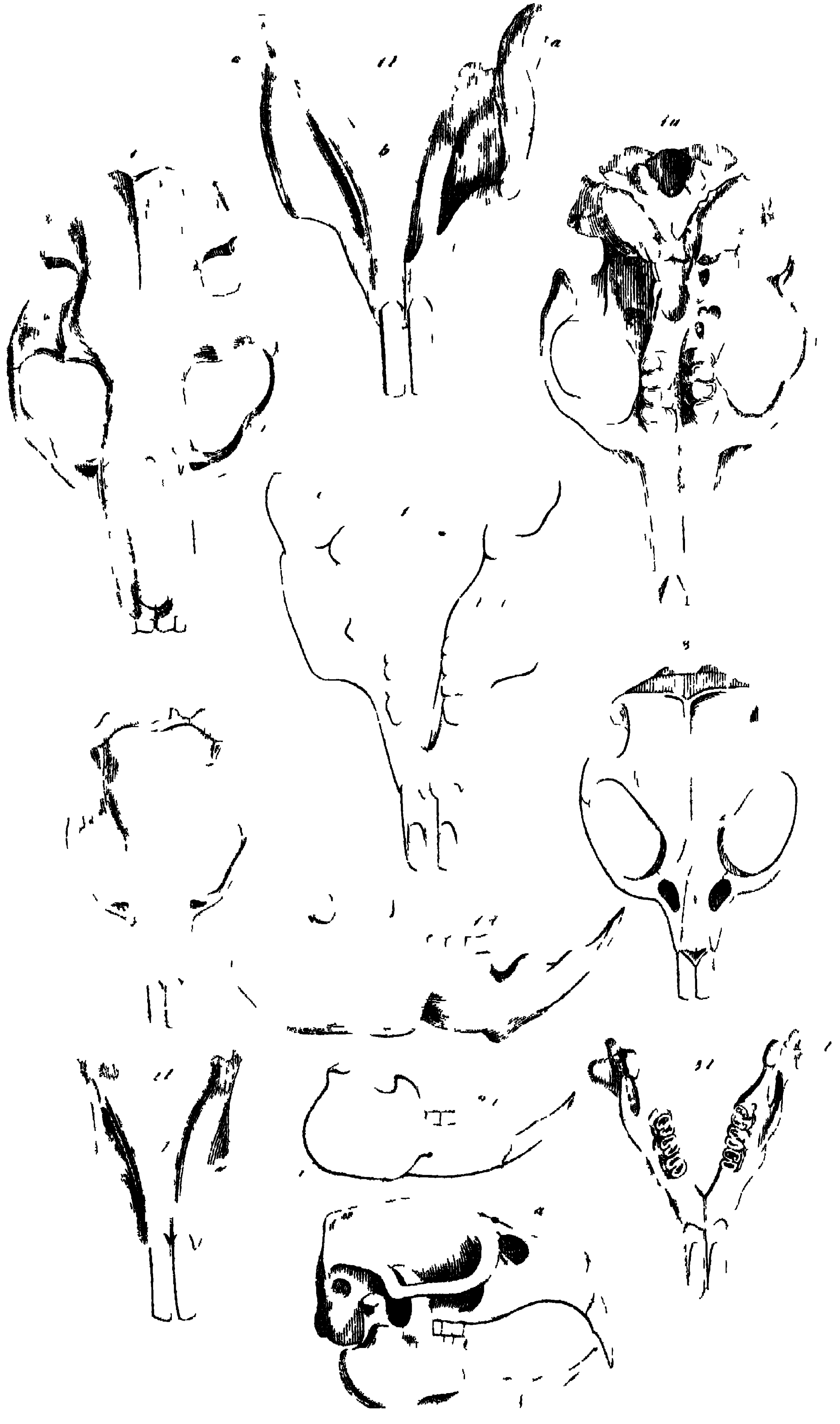


Structure of Annular Vessels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THE ANNALS
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No 49 OCTOBER 1841

IX —*Observations on the* Rodentia By G R WATERHOUSE, Esq , Curator to the Zoological Society of London

[With a Plate]

[Continued from p 600, vol iii , N S of the Mag Nat Hist]

Family VI BATHYERGIDÆ

THIS family appears to be entirely confined to Southern Africa, and is composed of but few known species, and these constitute the two genera *Bathyergus* of Illiger and *Orycterus* of F Cuvier

The situation which the *Bathyergidæ* should occupy among the Rodents is difficult to determine They agree with the *Hystrices, Capromys, Echimys,* &c in having the descending ramus of the lower jaw thrown out from the *outer side* of the alveolar portion, but in the genera just mentioned the descending ramus is of a triangular form, and the posterior angle is produced and pointed They moreover always have a large ant-orbital opening, the palate is almost always deeply emarginated behind, and the malar bone is deep and compressed These and other characters which I shall have to notice in my next paper, I seek for in vain in the *Bathyergidæ*, and on the other hand, when I turn to the Murine or Sciurine groups, I do not find a single example in which, combined with other characters peculiar to those groups, the descending ramus of the lower jaw is *not* thrown out from the *under* side of the alveolar portion Of the *Bathyergidæ* I am acquainted with but four species*, and of only two of these have I had an opportunity of examining the skulls, viz *Bathyergus capensis* and *Orycterus maritimus*

Their chief characters are as follows —

Dentition —Incisors broad, molars $\frac{3-3}{3-3}$ or $\frac{4-4}{4-4}$, subrooted, small, equal, or very nearly equal, in size, and the series on each side of each jaw parallel

In *Bathyergus* the incisors of the upper jaw are less curved than in most Rodents, and remarkable for their great length, being extended backwards behind the last molars, they are destitute of longitudinal grooves The molars are $\frac{3-3}{3-3}$, the entering folds of enamel are very simple, there being but one external and one internal deep fold to each tooth

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* *Bathyergus capensis*, Desm , *B caecutiens*, Licht (which is the *B Hottentotus* of Lesson and Garn , and the *B Ludwigii* of Dr Smith), *B Damarensis*, Ogilby, and *Orycterus maritimus*

In *Orycterus* the upper incisors are shorter and much more curved, and are furnished with a deep longitudinal groove in front, those of the lower jaw are destitute of grooves, are very deep from front to back, and slightly concave at the sides The molars are $\frac{4-4}{4-4}$, nearly cylindrical, but their antero-posterior diameter is the shortest, excepting in the front molar of the lower jaw In the skulls before me the teeth are worn, and exhibit scarcely any trace of folds of enamel entering into the body of the tooth

In both genera the enamel of the incisors is colourless, and the incisors of the lower jaw are extended backwards to the condyle

The skull of the *Bathyergida* is rather broad, much contracted between the orbits, and (as in other Rodents which live for the most part underground*) the cranial cavity is proportionally small The nasal bones are narrow and elongated In *Orycterus* they are nearly of equal width throughout, whilst in *Bathyergus capensis* they are considerably broader behind than before The anterior root of the zygomatic arch is formed entirely of the superior maxillary bone, and incloses a small ant-orbital opening the lower boundary of the zygomatic process of the maxillary is slightly concave, so that the anterior portion of the zygomatic arch is slightly thrown up from the plane of the palate This is more decidedly the case in *Bathyergus Capensis*, in which the ant-orbital foramen is rather larger The malar bone is of moderate size, and is extended backwards so as to enter into the composition of the glenoid cavity The portion of the palate situated between the molar teeth is remarkably contracted, and this part descends below the level of the anterior portion of the palate, and is continued some distance beyond the last molar The incisive foramina are very small, and there are no openings in the posterior portion of the palate The glenoid cavity of the temporal bone is very broad In *Orycterus* the posterior portion of the malar bone forms a longitudinal ridge, which no doubt tends to restrain to a certain extent the lateral motion of the condyles of the lower jaw, but in *B capensis* this ridge is wanting The auditory bullæ are of moderate size—larger in *Orycterus maritimus* than in *B capensis* In the former animal the upper surface of the skull forms nearly a straight line in the longitudinal direction, being but slightly arched, and the plane of the occiput is vertical, whereas in *B. Capensis* the plane of the occiput is slightly oblique, receding from the upper part.

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* Compare the skull of the burrowing Marmots with that of their congeners the Squirrels, and that of *Spalax* with the Rats

Lower Jaw.—The lower jaw has the descending ramus (*a*) Plate II, thrown out from the outer side of the alveolus of the inferior incisor (*b*).

In *Bathyergus Capensis* the descending ramus approaches somewhat to a semicircular form; its greatest extent is in the longitudinal direction of the jaw, and its greatest depth is beneath the condyle; in front it is curved suddenly upwards and inwards so as to form an obtuse angle at (*c*).

In *Orycterus maritimus* the descending ramus is thrown much more boldly out from the alveolar portion of the jaw, and is of very great extent; the lower part is curved inwards, and the posterior part is produced far beyond the line of the condyle, becoming gradually narrower towards the extremity.

The coronoid process is small in these two genera, and situated in a line with the last molar. The condyloid process is short, and the articular surface is large and rounded.

As regards the characters furnished by the skull and lower jaw, the present group is very isolated. In the structure of the molar teeth and in the contracted form of the palate between them, *Bathyergus* approaches most nearly to *Spalax**, but in other cranial characters there is a wide difference.

The skull of the animal figured by Dr Ruppell under the name *Bathyergus splendens* agrees in most of its characters with that of *Spalax*, and in some respects links that genus with *Rhizomys*; here the ant-orbital foramen is of moderate size and opens obliquely upwards, the coronoid process is long as in *Spalax*, the lower incisor runs backwards and outwards, and the thin layer of bone covering its base forms a protuberance (*d*) on the outer side of the condyle (*e*), in this respect resembling both *Rhizomys* and *Spalax*. The descending ramus springs from the under side of the alveolus of the inferior incisor, and not from the outer side, as in the true *Bathyergidæ*. The posterior part of the descending ramus is not directed outwards, as in *Spalax*, but is on the same plane as the horizontal ramus, as in *Rhizomys*. The molar teeth agree closely with those of *Spalax*, as well as with *Bathyergus*, being nearly cylindrical, of equal size, and having but one external and one internal fold of enamel; the incisors are proportionally broader than in *Spalax*.

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* I was induced, owing to the remarkable form of the lower jaw, to place *Spalax* near to *Geomys*, but upon re-examination I fear I have given too much weight to that character. This genus I have no doubt will prove an aberrant form of the *Muridæ*, and I think it will be more correct to regard the *Arvicolidæ* as constituting a subfamily of that group than as a section of equal importance. Since the publication of the former parts of this paper I have had an opportunity of examining several skulls belonging to species of these sections which I had not before seen. The skull of *Rhizomys* I was only acquainted with through Temminck's figure; the skull itself I have now examined, and I am quite satisfied that the animal belongs to the family *Muridæ*. The skull of *Ascomys mexicanus* I find agrees in all essential characters with that of *Geomys* (see fig 71 p 596, Mag Nat Hist vol iii New Series). The differences between *Ascomys*, *Geomys*, *Diplostoma* (Richardson) and *Pseudostoma* are, it appears to me, not of sufficient importance to entitle them to rank as distinct genera. These genera or subgenera form a very natural little section of the *Arvicolidæ*, differing from the more typical species of that group in having $\frac{4-4}{4-4}$ molars, and these small and of very simple structure, and also in the absence of any ant-orbital foramen for the transmission of a portion of the masseter muscle; the very small slit found at the root of the zygoma in these animals evidently serves only to admit the passage of the ant-orbital nerve.

The great difference between the skull of *Bathyergus splendens* and that of *Spalax typhlus* consists in the form of the occiput, it being vertical in the former, or very nearly so; but I very much suspect that the peculiar form of occiput which we observe in *Spalax typhlus* (which is the only species of the genus the skull of which I have seen) does not constitute a character indicative of affinity. I think it very likely to vary in the different species of the genus.

On the whole, it appears to me, that the animal called *Bathyergus splendens* by Ruppell should be removed from the genus in which he has placed it, and might be arranged either with the species of *Spalax* or perhaps between that genus and *Rhizomys*, and I think it probable Rodents may hereafter be found connecting the *Bathyergidæ* with these genera.

EXPLANATION OF PLATE II.

Fig. 1.	Skull of *Orycterus maritimus*.
1 *a*.	Under side of do.
1 *b*.	Under side of lower jaw.
a, *a*.	Descending ramus.
b.	Alveolus of incisor.
1 *c*.	Lower jaw viewed from above.
1 *d*.	Side view of do.
Fig. 2.	*Bathyergus capensis*.
Fig. 2 *a*.	Lower jaw of *Bathyergus capensis*, viewed from beneath.
2 *b*.	Side view of do.
Fig. 3.	*Bathyergus splendens* of Ruppell.
3 *a*.	Side view of skull.
3 *b*.	Lower jaw, view from above.
d.	Termination of incisor.
e.	Condyle.

X.—*Observations** *on the Functions performed by the Hairs on the Stigma in* Campanulaceæ, Compositæ, *and other Plants*. By Arthur Hill Hassall, M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

I have read with much interest some observations by M. Adolphe Brongniart on the 'Functions of the Hairs on the

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* The principal of these observations were written during the summer of last year.

Stigma in the Fecundation of Campanulaceæ,' contained in a recent Number of the 'Annals,' and translated by W A Leighton, Esq To this subject, previously to the appearance of these remarks, I had paid some attention I do not, however, concur in all the conclusions arrived at by that able investigator

If the flower-bud of any of the Campanulæ be examined a day or two prior to the expansion of the corolla, the stamens will be observed to envelope and conceal the whole surface of the pistil If it be again examined, about the period of the unfolding of the blossom, the anthers may be seen to open and disclose their contents As soon as this has occurred, the stamens having performed the office allotted them, begin to wither away, in consequence of the juices destined for their nourishment being now directed into a new channel The pistil, immediately on the dehiscence of the anthers, increases rapidly in size, carrying with it in its upward progress, (as by a brush) by means of the hairs upon its surface, the pollen granules This increase, amounting frequently to thrice the original length of the pistil, arises, partly, from the excitation of the new action now set up in it, but mainly from the accession of the nutriment formerly sent to the stamens, but now no longer required by them

These hairs are found in all the Campanulaceæ, save only the small genus *Petromarula*, extending from the base of the style to the apex of the stigma, externally, and arranged in lines, corresponding in number and position with the stamens, they are directed horizontally and slightly curved at their extremities Their surface is lubricated by a secretion, or perhaps, I should rather say, an exudation, serving to retain the pollen in contact with them The office performed by these hairs is undoubtedly purely mechanical, acting, first, as collectors of the pollen, and subsequently, as props, to sustain it in contact with the fecundating surface—entangled amidst the hairs it is not readily scattered or disturbed Adolphe Brongniart's account of the anatomy of the hairs I consider to be satisfactory, although I do not deem his comparison of their retractile movements to that of certain Annelides, or the tentacula of snails, to be at all analogous, the phænomenon in the latter cases being *voluntary* and *vital*, the result of complex organization, and, in the former, merely mechanical, presenting nothing peculiar or extraordinary in its nature, but arising simply from the absorption or drying up of the fluid contained in the hair itself, and in the expansion at its base*

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* The retraction of the hairs does not take place until some days after the application of the pollen, the greater part of which then falls off in con-

M. Brongniart states, "that the pollen grains undergo no modification either during their application to the hairs or when drawn along with them in their retractile movement, and consequently no connexion exists between them and the interior of the style." From this it follows, that fertilization can only take place through the medium of what are considered to be true stigmas, viz. the internal surfaces of the three (occasionally four) diverging rays on the top of the style. This statement is wholly opposed to the result of my investigations. The outer of the mass of pollen grains adherent to the hairs certainly suffer no material change; but if those in contact with the style be examined, a single pollen tube of considerable length may be observed to pass from the greater number of the granules, apparently losing itself in the tissue of the style, which I believe it to penetrate through the interspaces between the hairs. This view of the matter is further supported by the following corroborative evidence. 1st. The great mass of pollen collected on these hairs, contrasted with the small quantity, or even occasional *absence* of it, on what is called the true stigmatic surface. 2ndly. The structure of the surface itself—it being covered with papillæ resembling the hairs themselves in all save length. 3rdly. That this surface sometimes does not expand, and when it does, frequently but to a small extent, and this only when the process of fertilization is evidently far advanced, and the flower itself sometimes even beginning to fade.

From the observation of these facts, I have come to the conclusion, that not only the surface of the true stigma, but more particularly of that portion of the style itself which is covered with hairs, is essentially concerned in the fecundation of Campanulaceæ.

These collecting hairs are by no means peculiar to the Campanulæ, but exist in the whole of the family Compositæ, and in many genera of other orders. I have observed them in *Collomia grandiflora, Veronica chamædrys, Hyacinthus orientalis, Ixia maculata, Haworthia radula, Godetia rubicunda,* and *Epilobium hirsutum.* In the Compositæ they are admirably adapted to the office they are destined to perform, viz. that of harrowing up the pollen grains, being all sloped upwards and terminating in a sharp point. These hairs in *Haworthia radula* cover the true stigmatic surface, are longest near the circumference, and become mere papillæ towards the centre of the stigma. In *Veronica chamædrys* they also cover the stigmatic surface, but a depression is to be observed in the middle free

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sequence of the loss of their support.—Adolphe Brongniart speaks of this retraction of the hairs as presenting a phænomenon unexampled in the vegetable kingdom.

from hairs, while in *Iria* they are arranged along the edges of the stigmata It is however to the structure of the stigmata of *Epilobium hirsutum* and *Godetia rubicunda* that I would particularly call attention, conceiving them to confirm in the strongest manner my opinion that the stigmatic function in the Campanulaceæ is not limited to that part which is usually considered to constitute the proper stigma These are quadripartite, and each division of their true stigmatic surface is covered with hairs precisely resembling those of the Campanulaceæ

I am about to try an experiment, the issue of which will determine the truth or fallacy of my deductions, as far as the Campanulaceæ are concerned As each flower of *Campanula pyramidalis* comes into blossom, I intend to cut away the whole of the true stigmatic branches, leaving only the lower portion of the style covered with hairs and pollen Should perfect seeds ripen upon this plant, the question will, I think, be satisfactorily decided

August 1841

XI —*On some species of European Pines* By Capt S E Widdrington*, R N

In a paper which was read before the British Association at Newcastle (Ann Nat Hist, vol ii p 163), the two species of *P austriaca* and *P Pumilio* were not fully described, nor their places in the system as to elevation assigned This deficiency, which was caused by my not having seen these species growing in their natural sites, a recent tour in Austria and Upper Germany has enabled me to supply

The *Pinus austriaca* of the English, *P nigrescens* of the German botanists, partly covers, as it no doubt once did entirely, the plain of Austria to the south and east of Vienna There is an extensive remnant of it between Neustadt and the foot of the Semering range, which divides Austria and Styria It also partly clothes the hills near Baden, but in ascending the range it soon disappears, and is replaced by the spruce and Scotch firs I am not aware of its being seen to the north of the localities I have mentioned, nor in the northern prolongation of the range, there called the Wiener Wald In Styria I never saw it to the north of the river Muhr, but it ranges to the south of Styria, forming a sort of link between the European pine series and that of the Caucasus and of Asia On considering the elevation and geography of these habitats, it must undoubtedly be placed in the zone below *P sylvestris* At the same time there is no question that it is sufficiently hardy to resist any cold to which it is liable to be exposed in these islands The thermometer at Vienna fell last winter to 19° of Reaumur, and in 1830 to 22°, or nearly 18° below zero of Fahrenheit, a degree I believe seldom, if ever, seen in Britain, at least in modern times

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* Late Cook Read in the Section of Zoology and Botany at the meeting of the British Association, Plymouth, and communicated by the Author See his paper on *Pinus* and *Abies*, Ann Nat Hist, vol iii p 296

This species is very nearly connected with *P taurica* or *Pallasiana*, the foliage is scarcely to be distinguished, but on comparing the cones of the two species, as grown in the Botanical Garden at Vienna, I was struck with a difference in the form of the scales, and had the satisfaction of being immediately told that the same remark had been made by Mr Brown, who had examined them As, however, experience has shown me the mistakes which are made by judging of pines from specimens grown in gardens, and especially in nursery grounds, where the treatment sometimes entirely alters the habit of the tree, I made application for, and was promised by the enlightened director of the botanical department, Mr Endlicher, cones of both species taken from the natural forests at the proper season, which will probably enable the question of their identity or distinctness to be decided

From the quick growth of this tree, the great beauty of its foliage, which is long, thick and tangled, and of the deepest green, as well as the great value of the timber, which the Austrian woodmen consider superior to that of *P sylvestris*, it cannot be too strongly recommended to the attention of planters It is equally fitted for the forest or the park, for use or for ornament, and its deep tints would form an admirable contrast with the light and transparent foliage of the elegant *Pinus hispanica* The country is very much indebted to Mr Lawson of Edinburgh, who first introduced this interesting species, and it cannot be too generally used with the *Laricio*, a congener, as a substitute for the *Pinaster*, which has rather unfortunately been tried in some parts of the West of England, the timber being comparatively valueless, and in every other respect very inferior to the species we are now considering It cannot be too strongly urged on those who have the care of making fir plantations for future utility, to plant the evergreens, which are to *remain*, at the requisite distances, and to have the fillings-up entirely of larch By adopting this method several advantages accrue The woodmen make no mistakes in selecting, during the process of thinning, and no spaces are left too open or too close The evergreens, which require more or less care when young, are more readily looked after, and their places supplied where necessary, in case of failure The larch should be planted a year or two before the evergreens, by which time the grass is grown, and affords a shelter and protection against the destruction of game, &c The trifling difference in the shelter between the evergreen and deciduous species is more apparent than real, and is more than compensated by the superior value of the larch thinning and the additional fertility imparted to the soil by the fall of the spiculæ By having only a definite number of evergreens, the landlord can afford to have better sorts, and expend more care upon the rearing and looking after them

On Pinus Pumilio

I have found the difficulty of obtaining information respecting this curious tree so great, that if, from the inspection of the beautiful specimens at Dropmore and in some other collections, I had not been quite satisfied of its being a distinct species, I might have been incredulous, and in the words of the schools, asked, "Quid est Pumilio?" or in the summary mode of writers and compilers who treat on trees they never saw in their natural forests, set it down as a "mountain variety" of some other species All doubt however on the subject my late tour in Upper Germany has completely enabled me to set aside, and more satisfactorily than I could possibly have anticipated I first met with it, though sparingly, in Upper Styria In the Saltzkammergut it is abundant, though high up, and above the Scotch and spruce, which form the mass of the forests in that beautiful region By far the largest portion was met with in the Bavarian Alps, which it inhabits from the base almost to the summit, and in every sort of ground, an extensive swamp or morass adjoining the Chiemsee, the principal lake of Bavaria, is covered with it, and the effect of its dwarf and even surface a few feet above the ground is curiously contrasted with the lofty forests of spruce and Scotch fir which surround the marsh wherever the ground is sufficiently dry to bear them

Although it flourishes in this strange locality, where no other fir or scarcely any other tree can exist, marshy ground is by no means its only or favoured habitat In the neighbouring mountains, where it is extremely abundant, I found it at the base of the chain, in the dry gravelly beds of the torrents, and it gradually creeps up the arid limestone to the very summit of the range which separates Bavaria and the Austrian Tyrol, living above its congeners of the forest and to the very limits of arboreal vegetation When seen in these situations from below, it could not, by the unpractised eye, be distinguished from furze or gorse

The peculiar form of this tree consists in its having no regular leader Immediately above the ground it divides into a number of smaller stems and branches, which either sweep along the ground, their extremities pointing upwards, or rise at once at an angle of 30° to 45°, according as the neighbours or the locality have permitted it to expand Very rarely—amongst countless thousands I did not see above one or two examples—one tree makes an attempt to grow straight and throws up a single stem, but the failure of attaining size or elevation shows in these instances the creeping, true habit of the tree The height attained is rarely above 5 or 6 feet, the diameter of the largest trees being from 20 to 25 feet, though this size is rare, and the appearance is so regular, that in looking over an extensive level planted with it, it is quite as even as the surface of a gorse cover

The foliage in form and colour resembles that of *P uncinata*, but the spiculæ are shorter, though standing out in the peculiarly rigid manner of that species The cones are small, dark-coloured, and differ from both *P sylvestris* and *P uncinata*

From the localities it inhabits it must be placed very high in the series, by the side of *P Cembra* and *P uncinata* I have been the more particular in describing this singular species, in order to guard those who may not have the opportunity of seeing it *in situ* from confounding it, as so many who ought to know better have done, with the stunted individuals of *P Cembra*, *P sylvestris* and *P uncinata*, which are always found at the summit of their respective zones in the high Alps and Pyrenees, and have been called and compiled under the general name of *Pumilio*

As to the œconomical uses of this tree, it is clear they amount to very little, its wood being only used for inlaying for furniture, such as parts of chairs and the like To those, however, who possess extensive parks, by planting them fifteen feet apart, and taking care of them during their early growth, they would be curious and useful covers for game

XII —*Diagnoses Algarum novarum a cl Dre Ferdinand Krauss in Africa Australi lectarum, auctore Dno* HERING, Stuttgartiensi*

Conferva natalensis, Hering Pilis simplicibus tenuissimis, articulis diametro sesquilongioribus, superioribus æqualibus *Conferva implexa*, Dillw proxima Port Natal

Dasya tenella Hg Fronde continua tereti, vage ramosa, ramulis bipinnatis, divaricatis

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* Communicated by Mr Daniel Cooper

Frons vix uncialis crassitie capillari, hyalina, granula angulata, coccinea in fronde hyalina seriatim digesta ad Port Natal sterilis

222* *Bryopsis setacea*, Hg Pilis setaceis subramosis, apice plumosis

Fila tenuia nitida 2—3-pollicaria setacea simplicia vel rarius ramulo laterali instructa apice ramentis brevibus simplicissimis lanceolato pinnata Color obscure viridis, chartæ arcte adhæret

Bryops Balbisianæ proxima *Hab* ad Port Natal Point Africæ meridionalis, scopulis littoralibus insidens

Caulerpa filiformis Hg Frondibus planis, linearibus, subdichotomis integerrimis

Surculus cylindricus filiformis stramineus infernè emittens radices fibrosas fasciculatas frons spithamæa adscendens basi cylindrica, annulato rugosa deinde plana linearis integerrima subdichotoma lineam lata color gramineus substantia membranacea

Synon *Amphibolis filiformis* Sch

Var β Fronde latiore ligulata

Var γ Fronde breviore palmata Forsan distincta species *Caulerpa palmata nominanda*

Ad Cape Lagullas, Africæ meridionalis in arena repens

Alsidium ericoides Hg Fronde tereti, continua filiformi ramosa ramentis brevibus subarticulatis, subulatis, dense imbricatis vestita

Radix callus exiguus, frons spithamæa teres ramosa, pyramidata, ramenta obtusiuscula zonis obscurioribus notata

Hab ad Port Natal Sub *Rhodomela ericoides* in collectione signata

Sphærococcus (*Chondrus*) *scutellatus*, Hg Fronde compressa dichotoma segmentis linearibus, capsulis sphæricis in margine discoque ramulorum sessilibus, scutellatis

Habitus *Sphærococ crispi* vel *linearis*, frons cartilaginea bipollicaris, vix lineam lata segmentis superioribus cuneatis, obtusis, color exsiccati atro purpureus

Sphærococcus (*Gigartina*) *nodiferus* Hg Fronde cartilaginea tereti subdichotoma segmentis irregulariter dentatis obtusis, dentibus apice capsuliferis

Color purpureus frons crassiuscula

Ad Port Natal, spec unica

Sphærococcus (*Gelidium*) *aculeatus*, Hg Fronde cartilagineo-cornea, ramosa verticillato-aculeata

Radix callus exiguus, frons cartilagineo-cornea 4—6-pollicaris internè teretiuscula, nuda mox bi- vel trichotoma lineam crassa, compressa, vel tri- aut quadrangularis aculeata, aculei oppositi, terni aut quaterni verticillati, lineam longi, basi dilatati, subu-

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* The numbers prefixed to the species refer to the numbers in Dr Krauss's Fasciculi of Natal Specimens A series of the species here described has been forwarded to the Herbarium of the Botanical Society of London, where they may be consulted on application

lati horizontales, interstitia bilinearia Fructus ignoti color coccineus exsiccatus rigidus, chartæ minimè adhærens

Hab ad Port Natal

272 *Martensia*, gen nov Frons plana areolata, avenia margine fenestrata, fructus duplex, sphærospermia longitudinaliter in reticulo simplici serie disposita, capsulæ sphæricæ, reticulo affixæ sporidia subglobosa foventes

M elegans Hg Fronde tenuissima, lobata, segmentis cuneato-rotundatis

Frons basi affixa semi usque pollicaris tenerrima, tenax cellulis angulatis areolata margine demum fructificante, clathrato-fenestrata Color amœne roseus fugax Chartæ arctè adhærens

Port Natal ad lapides

In memoriam amicissimi Georgii de Martens, auctoris Floræ Wurtembergicæ, algarum maris Mediterranei scrutatoris indefessi —Hering

197 *Nemalion Natalense* Hg Fronde filiformi ramosa ramis elongatis villosis villis articulatis

Color olivaceus, chartæ arcte adhærens *Hab* ad Port Natal Point, Afr meridionalis

Fucus minimus Hg Fronde plana ecostata, lineari dichotoma, integerrima

Vix pollicaris, fronde semilineam lata, spiraliter torta

Port Natal

XIII —*Observations on the Structure of the Pollen Granule, considered principally in reference to its eligibility as a means of Classification* By ARTHUR HILL HASSALL, M R C S L, Corresponding Member of the Dublin Natural History Society

IT has often been a matter of surprise to me, that no one of the numerous and gifted votaries of those bright and beautiful creations, flowers, which are scattered with so profuse a hand over moor and mountain, on hill and through dale, should have fully investigated the structure of the pollen granule in the various tribes of plants, with a view to ascertain whether it could be rendered available for the purpose of classification

Much has indeed been written upon its general anatomy, but the characters of the granules, as they occur in each genus of plants, appear to have been scarcely at all considered in this country, and almost the only figures which we possess of individual pollen grains are contained in Lindley's 'Introduction to Botany,' and were derived from a work of Purkinje on the subject*

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* These figures are but little more than mere outlines, and even in this single particular are generally very far from being correct

On the Continent entire works have been published upon the pollen, accompanied by numerous figures I allude particularly to Purkinje's work, 'De Cellulis Antherarum fibrosis,' &c , to that by Fritzsche, and to a memoir by Mohl in the 'Annales des Sciences Naturelles,' all of which have appeared within, I believe, the last ten years

With the opinions contained in these works I am only acquainted in so far as they are given us by Lindley, as I wished, before consulting them, to form a separate and independent opinion, so that all I shall advance in this paper is to be regarded only as the result of my own investigations, and rests upon my own responsibility It is my intention to publish, from time to time, a series of papers upon the subject of the Pollen, in some of which I shall give the opinions of the authors to whom I have referred more at length, thus my not doing so at present will be of but little consequence

Although I do not anticipate that the results of this inquiry will be very considerable in a practical point of view, I yet feel that I ought not to be deterred from the pursuit because I am not at once able to perceive any great utility attached to it, the subject is one of much interest in itself, and may ultimately lead to more than is at present looked for

I could have wished that an investigation of such nicety and extent had fallen to the lot of some individual of greater capability and experience in microscopical research, but as this is merely an essay, and as I shall advance nothing but what I have fully made out, I trust that the inquiry will not suffer by reason of my comparative inefficiency for the task I have undertaken

Conceiving then that the want of an accurate knowledge of the form and structure of the pollen grain in the different genera of plants constituted a desideratum in botanical science, I commenced the investigations the results of which I am about to detail early in the spring of last year, continued them throughout the greater part of the summer, and the small amount of time which I have this season been able to spare from professional pursuits has been employed in correcting and confirming the conclusions previously arrived at

I shall divide my subject into three heads Under the first head, the pollen generally will be spoken of, under the second, the individual peculiarities of the pollen granule will be noticed, and lastly, the pollen will be considered with a view to ascertain whether it can be rendered available as a means of classification

First then, of the pollen generally

The structure, form, and size of the pollen granule varies considerably in different tribes of plants

There are, however, certain types of structure and of form which occur more frequently than others Of these, the cylindrical and elliptical are by far the most common , and next, in frequency of occurrence, are those granules of either a triangular or circular form, which are met with in nearly an equal proportion A great variety of other forms are to be noticed, which it is the object of this paper especially to describe

The term cylindrical is applied to all those grains which are more or less of an elongated form, are somewhat triangular, and taper towards each extremity, which exhibit a furrow along their upper surface, and are furnished with three pollen tubes, while the word elliptical is used to designate those granules which agreeing somewhat with the former in their lengthened shape, having also a line upon their surface, yet possess but one pollen tube

On the application of any fluid to pollen of an elongated form, of less density than the fovilla contained in the cells, a remarkable alteration of shape takes place with great quickness Each grain of pollen, prior to the contact of the liquid, lies on the object-glass of the microscope with its *long* diameter placed horizontally, immediately on its touching it the position of the long diameter is changed, it becomes vertical, and the pollen grain, losing in length, dilates and becomes of a triangular or circular form , and this change of form, which is here produced by the direct application of the water, occurs also naturally previous to the emission of the pollen tubes, arising partly from the absorption of fluid from the tissue of the anther, but mainly from the imbibition of the stigmatic secretion But if a fluid of greater density than that within the cell be applied, no such change is seen to occur, a contraction of the pollen grain and an exudation of a portion of its contents taking place

This alteration of form, in both instances, is very satisfactorily explained by a reference to the principle of endosmosis and exosmosis, which is most beautifully exemplified in the interesting though minute subjects of the present inquiry, and all the varied phænomena of which are referred by Dutrochet to capillary attraction

Each pollen grain consists of a turbid fluid called fovilla, containing numerous active molecular particles , and this fluid is enclosed, according to most observers, in at least two membranes, the outer being called extine, the inner intine, and this is of a highly extensible nature The only exception to this, according to Mohl, is the pollen of Asclepiadaceous plants, which has but one envelope; but Fritzsche has asserted, according to Lindley, that these plants have both an extine and intine. Fritzsche also states, that in *Caulinia fragilis*, *Zannichellia pedunculata*, *Zostera marina*, and *Naias minor*, the pollen has really nothing but the intine present.

That there really are two coatings to the great majority of pollen granules does not admit of a doubt, while a third membrane, intermediate between the extine and intine, has been noticed, first by Mohl and subsequently by Fritzsche, who calls it exintine. Mohl observed it in the pollen of *Taxus*, *Juniperus*, *Cupressus* and *Thuja*, and Fritzsche finds it not only in these plants, but also in *Pinus*, *Cucurbita Pepo*, and *Tigridia Pavonia*, while Mr. Giraud[*] states (in the third volume of the 'Annals and Magazine of Natural History,' p. 127) that he has noticed it in the pollen of *Crocus vernus*. To these I may add the pollen of the different species of *Banksia* and *Dryandra* as possessing a third membrane, as well as the following list of plants, *Fuchsia fulgens*, *F. cylindrica*, *F. thymifolia*, *F. gracilis*, and *F. coccinea*, *Stachytarpheta mutabilis*, *Tilia americana*, *Calothamnus villosus*, *Zizyphus Paliurus*, and probably also *Grevillea linearis*, *Hakia pedunculata*, *Erythrina laurifolia*, *Didiscus cæruleus*, *Fumaria officinalis*, and all other species of *Fuchsia*. It is necessary to observe great caution in deciding upon the presence of a third membrane, as an appearance is frequently observed which might mislead; it arises from the entrance of water within the sac of the intine, separating the fovilla from it, forcing it inwards, and giving it a very defined margin.

At the commencement of this inquiry, I was induced to consider that the reticulation observable on the pollen of *Pancratium*, *Armeria*, *Statice*, *Passiflora*, &c. constituted the basis of a distinct membrane, and in the figures of these which will follow it is so represented. To this opinion I was led by noticing the raised appearance which it presents, especially round the circumference of the granules, as well as from the circumstance of the ends of each grain of pollen in *Pancratium* being destitute of the reticulation; but it is more correct, perhaps, to regard this reticulated appearance as produced by the apposition of the cells of which the extine is formed in these instances.

Fritzsche also speaks of a fourth coat, which is next the extine, and which he calls intextine, as belonging to the pollen of *Clarkia elegans* and other *Onagrariæ*. Of the existence of this membrane in *Clarkia* I have but little doubt, and I believe that it is also present in those species of *Fuchsia* which I have mentioned as possessing a third tunic, as there are in the pollen of these precisely the same appearances upon which the opinion of its presence is founded in *Clarkia elegans*

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[*] Mr. Giraud, in the same communication, mentions having seen small opake particles on the surface of the pollen grain of *Polemonium cæruleum*, which exhibit a peculiar motion when the granules are placed in water.

The pollen granules of *Saponaria viscida* present, when viewed through the medium of oil, a very remarkable appearance, which I am only able to explain by supposing that it depends upon some peculiar inversion or pitting of the extine It conveys the idea of a membrane of a circular form, smaller than the extine, being placed within it, and pollen tubes to the number of ten escaping through apertures in it and extending to the margin of the outer membrane I refer to this appearance here in the hope of directing the attention of other observers to it, who may perhaps be able to afford a more particular explanation of its nature

In the long axis of those granules to which the terms cylindrical and elliptical are here applied, as well as of many others, a line or furrow, as has been already remarked, is noticed, concerning the nature of which various conjectures have been hazarded, and none of which afford the true explanation of the phænomenon Malpighi compared granules of pollen of this kind to grains of wheat, on one side of which a furrow exists, but this does not account for the furrow being visible in every grain at the same time, Guillemin, attempting to account for the constant presence of the line, says that it exists on both sides of the grain He further supposes this furrow to be a slit intended to facilitate the admission of water into the interior of the granules, and the emission of their contents, neither is this explanation more satisfactory Fritzsche states it to be a thin part of the extine where the sides of the pollen grain are contracted and meet, producing the appearance of a furrow, while Mr Giraud regards this line as a mere furrow in the extine which disappears on the application of moisture, in which opinion Professor Graham coincides*, but neither of these gentlemen offer any explanation either as to its origin or use

The true explanation of the nature of this furrow, about which there are so many opinions, is, that it is a deficiency in the external membrane of the pollen grain, intended to facilitate the egress of the pollen tubes, one of which may be distinctly seen to issue from each, and the fact of its being seen at the same moment in every grain of pollen is accounted for by reference to the form of these granules Those grains of pollen to which the term cylindrical is applied, are, as has been already noticed, more or less of a triangular or trilobate form, and at each angle, or between each lobe, a furrow exists, so that, as each granule, from its shape, must rest upon one or other of its sides, one angle and one line will necessarily be presented to the eye of the observer But another explanation is requisite to account for its constant presence in those granules to which the term elliptical is assigned, these, though of an elongated form, like the others, are rounded in their short axes, except on one side, which is slightly flattened and indented In this indenture the single furrow possessed by these granules is placed, hence it results that each must rest either on its flattened surface, with the furrow looking downwards, as most frequently happens, in which case it will still be apparent through the body of the granule, owing to its transparency, or it will fall on the rounded surface opposite the furrow, which now looks directly upwards Thus, in whichever way the grain rests, the furrow will still be apparent Should it alight upon its side it will not remain in this position, but will roll over to the convex surface, which constitutes its centre of gravity*

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* See Ann and Mag of Nat Hist already referred to, and Prof Graham's Third Annual Report, read before the Botanical Society of Edinburgh, March 1841

The pollen grain of *Crinum amabile* is flattened and broad on *two* surfaces, differing in this particular from the pollen of all other *Amaryllidaceæ* which I have examined, down *each* of which a furrow is placed, and from this form also it follows that one line will ever be opposed to view, as the granules rest upon one of their broad surfaces And again in *Citrus aurantium*, *Ranunculus acris* and *Rubus fruticosus*, the granules are somewhat elongated, and consist of *four lobes*, between which the fissures are placed, and as they most generally lie on two of the lobes, the other two, with a fissure between them, will, as a matter of course, be turned upwards

Lastly, many kinds of pollen, as of the *Polygalæ*, *Cruciancllæ*, *Labiatæ*, &c , are furnished with a number of furrows, some of which, in all postures, will be visible A careful examination of the pollen granules of *Convolvulus arvensis*, *Lilium longiflorum*, *Crinum amabile*, and *Ranunculus acris*, will convince any one of the correctness of this explanation, both of the nature of these lines, and of the reasons for their invariable appearance in each granule at the same moment

In most elliptical pollen, covering each of the fissures, an oval piece of membrane is to be observed, the use of which I conceive to be to prevent the pollen tubes from escaping too readily from the extine, to which it does not appear to be organically united, as on the application of water it is seen to curl up and fall off the granules It is also met with in *Centaurium, Scolymus, Dipsacus, Scabiosa,* and some allied genera, in these instances it sometimes has an attachment to the extine

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* Malpighi's comparison of granules of this form to grains of wheat is by no means inapt, but still without the above explanation it is incomplete, inasmuch as it does not account for the constant appearance of the furrow

The extine, or protective membrane of the pollen grain, on which its shape depends, is of much greater substance than the intine, which is so fine, that rarely can any appreciable thickness of it be detected It is seldom, if ever, a simple homogeneous membrane, being most generally formed by the apposition of a number of cellules held together by "organic mucus," which give to it a reticulated appearance, very obvious in many of the *Liliaceæ,* as well as in a great variety of other plants In most hispid pollen, where the same reticulated structure may be traced, from the centre of each cell of the network, either one of the numerous spines which cover this form of pollen grain may be seen to arise, or, where this is absent, an aperture for the passage of a pollen tube will be apparent

If this view of the structure of the extine be correct, then must it consist of two layers, as each cell forms a shut-sac

By some observers the external tunic of the pollen grain is said to present a granular *structure* It often presents a granular *appearance,* which is deceptive, and which I have found to arise from the circumstance of the particles in the fovilla being visible through their transparent coverings

It has been matter of doubt whether the extine be extensible or not, that it really is so in some cases to a considerable extent, is apparent from the following fact, the only one with which I am acquainted which distinctly proves it The surface of the pollen granule of *Canna indica* is covered with numerous points, having their free extremities perforated When the pollen is immersed in water the spines disappear, leaving small apertures on the surface of the now smooth extine, each granule at the same time having enlarged to about thrice its original size This change occurs with greater rapidity if a dilute mineral acid be used instead of water All kinds of pollen appear somewhat larger in water, but this depends upon the magnifying power of that liquid The intine does not expand in an equal proportion with the extine, but being pressed upon equally on all sides by the water which is imbibed by the extine, is forced inwards, and a large space filled with fluid is left between the two membranes

After diligent and repeated search, I have at last succeeded in making out the plano-convex bodies (*Zunschenorpern*) described by Fritzsche as being particularly visible in some *Mal-*

vaceæ, in a species of *Hibiscus, H africanus* He represents them as existing in most hispid pollen, the apertures in which for the passage of the pollen tubes they close, being placed between the extine and intine, with their convex surfaces resting upon the latter If the pollen of the above-named species of *Hibiscus* be allowed to remain in water for a short time, the pollen tubes will be seen to have emerged some distance from the intine, and upon the extremities of many of them those pieces of membrane will be noticed, which are however more frequently concavo-convex than plano-convex Although I have not seen these bodies closing the apertures in the extine, it may be inferred with tolerable certainty that they perform the office ascribed to them, from their position at the terminations of the pollen tubes Those who may wish to observe them will not experience the same difficulty that I have done, knowing the species and the manner in which to look for them They are not present in the pollen of the *Ipomœæ*

The surface of all pollen is covered with a thick tenacious matter, which, according to Mohl, is most abundant upon that which is hispid, but it is at least as much so on the pollen of many species of *Labiateæ*, which are not hispid, but reticulated If this viscid substance is to be regarded as a secretion, then must the extine be provided with glands, or some other peculiar organization for its formation, for a true secretion can only result from organization of some kind or other, and, in the vegetable kingdom, may be defined to be a new product, eliminated from the sap through the instrumentality of glands or other structural media My own opinion is, that it is a secretion, if not formed by the external membrane of the pollen grain itself, derived from the cell in which it is originally developed I was at first inclined to consider it as a mere exudation, consisting of the thinner parts of the fovilla, but its appearance and consistence differ so much from this, that I believe the opinion to be scarcely tenable This secretion fulfills an important indication in preventing the too easy dispersion of the pollen granules, which it slightly holds together, and which would be scattered far and near, wide of its destined mark, by every breath of wind

Pollen granules, though usually separate, are occasionally found united This union is either temporary, the medium which retains them in contact with each other being either a tenacious secretion, or filaments of the cellular tissue derived from the breaking up of the cells in which the granules are originally developed, or it is permanent and organic We find the first mode of union in the pollen grains of the *Epilobia**, *Salpiglossis atropurpurea*, and in *Lechenaultia formosa*, while the second is met with in all the genera of the natural order *Ericaceæ* which I have had an opportunity of examining, in the *Acaciæ, Mimosæ, Junci*, many species of *Orchidaceæ*, and in *Oxyanthus speciosa*. Some of these grains, though they usually are permanently attached, are yet capable of separation; but others of them again, as the *Ericaceæ*, &c., are so intimately joined, that they never become separated. The number of pollen grains thus united together is definite, being either four, or multiples of four up to sixteen, but the first number is of the most frequent occurrence; thus there are four in the *Ericaceæ, Epilobia, Junci, Orchidaceæ, Oxyanthus speciosa*, and *Salpiglossis atropurpurea, Lechenaultia formosa* and *Mimosa mexicana*. In *Acacia rigens* there are eight, disposed on the same plane; in *Acacia decipiens* twelve, six being disposed on the same plane, while three are placed in the centre, on either side of the flat figure so formed; and in *Acacia linearis* there are sixteen, eight upon the same plane and four on either side. It is to be observed, that dark lines run between every four grains, indicating either their original separation or their tendency to become so separated. When the union of pollen grains occurs in fours, they are either disposed upon the same plane, as in the *Epilobia* and *Lechenaultia formosa*, or they appear as if one was placed upon the other three, all the granules bearing precisely the same relations to each other, and whichever one is uppermost, the rest being similarly circumstanced in reference to it. One exception occurs to the law of the union of pollen grains in fours in *Epilobium roseum*, where they generally unite in threes.

As a rule, but one mode of arrangement prevails among the pollen grains of the same species.

Pollen grains are often held together by a thready substance, supposed to be derived from the rupture and breaking up of the cells in which they are primarily formed, in the meshes of which they become either entangled, or to which they are attached by the secretion which covers their surface. It appears to me that neither the origin nor use of these threads are rightly made out. They are found in great abundance in the pollen of the *Ericaceæ*, *Fuchsiæ*, *Œnotheræ*, and other *Onagrariæ*.

The size of the pollen granule differs as materially as does its form and structure, as will be obvious from a perusal of the following table of relative sizes, although in the same species and in genera of the same family it is pretty uniform

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* The granules in *Epilobium angustifolium* are not united, resembling much more those of the Clarkias than the Epilobiums.

The micrometer employed was a glass one, and divided in the ratio of 249,000 spaces to the inch

Cobæa stipularis		$\frac{5}{249\,000}$
Lavatera acerifolia		$\frac{4}{249,000}$
Geranium sylvaticum		$\frac{2}{249\,000}$
Fuchsia fulgens		$\frac{2}{249\,000}$
Lilium tigrinum	Length	$\frac{1\frac{3}{4}}{249\,000}$
	Breadth	$\frac{\frac{3}{5}}{249\,000}$
Viola tricolor	Length	$\frac{1\frac{1}{2}}{249\,000}$
	Breadth	$\frac{\frac{3}{4}}{249\,000}$
Salvia patens		$\frac{1}{249,000}$
Anagallis arvensis	Length	$\frac{}{249\,000}$
	Breadth	$\frac{\frac{1}{3}}{249\,000}$
Bauera rubioides		$\frac{\frac{1}{18}}{249\,000}$
Myosotis palustris		$\frac{\frac{1}{50}}{249,000}$
Mimosa marginata		$\frac{\frac{1}{67}}{249\,000}$

The colour of the pollen is extremely various and often brilliant In *Gilia achilleæfolia* and *Petunia violacea* it is of a dark blue In *Collomia rosea* it is of a bright cærulean blue, deep red in *Cleome spinosa*, of a reddish brown or mahogany colour in *Lilium tigrinum*, and scarlet in ***Huchera americana*** and ***Verbascum Thapsus*** In ***Papaver Rhæas*** and ***Tulipa Gesneriana*** nearly black In ***Convolvulus sepium*** opake white, and yellow, the most common colour of the pollen, in ***Lilium album*** and ***longiflorum***, owing to the dense yellow-coloured secretion with which the granules are covered Dr Lindley says that the pollen occasionally assumes every colour except green, it is however perfectly green in ***Pentstemon*** *pentaphyllum*, *Besseria elegans* and *Lythrum Salicaria*, in this last it is curious to notice, that while the pollen of the upper stamina is green, that of the lower ones is of a bright yellow

Pollen tubes are prolongations of the intine, and are filled with the fovilla, which passes into them by gravitation They vary much in number, size, and arrangement, they issue either through fissures or apertures in the extine, and where there are three envelopes, through similar provisions in the second also Except in some few instances, I have not been able to discover any provision in the extine for the escape of the pollen tubes These exceptions occur in the genera *Canna*, *Strelitzia*, *Roscoea* and *Hedychium*, all of which belong to closely-allied orders, and in which the extine, which is of great thickness, forms a shut-sac If water, and more quickly if dilute nitric acid, be applied to the pollen, the granules are seen to enlarge a little, and the extine to crack irregularly, but often separating into three unequal pieces, while the intine, having undergone no change except a slight increase of size, and still containing the fovilla, frequently disengages itself from its envelope and floats away from it This cracking of the extine is assuredly the natural means by which the pollen tubes are afforded an outlet, and it is not necessary that the intine should be denuded at any particular spot, for wherever it is so it possesses the power of elongation, or rather *growth* In one or two cases the apertures are provided with valves, as in the different species of *Passiflora*, as first noticed by Purkinje Fritzsche has described one valve in the grasses, two in the nettle, four in the orange, and six in the primrose Although I have searched with care for these valves, I have not been able to detect any trace of them, and am strongly inclined to deny their existence in any of these plants

The primary form of the pollen of the orange precludes the possibility of its being furnished with regular valves, the pollen tubes issuing through *fissures* and not circular apertures, while had a valve been present in the grasses, I think I must have detected it in the pollen of the *Zea Mays*, which is of a very large size, and in which the apertures for the escape of the pollen tubes are very visible The nettle I believe to possess *three* pollen tubes

The emission of the pollen tubes is produced, artificially, by the action of the mineral acids and water, and naturally, partly by the rarefaction of the contents of each pollen granule by the sun's heat * (the rarefied fovilla distends the shell of the pollen grain, which produces pressure upon its contents, and assists in forcing them out in the only direction in which they can issue, namely, through the openings provided for the purpose), partly by the granules imbibing a portion of the stigmatic secretion, some of which gets between the outer and inner membranes, producing pressure upon the latter, and partly by the stimulating effect of that secretion

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* The effect of heat upon the pollen has occasionally been demonstrated when I have been examining it under a strong reflected light of the sun, by the emission of the pollen tubes, and even rupture of the intine

Pollen tubes are supposed to be elongated by means of the distension or stretching of the intine This opinion appears to me to be erroneously entertained It is difficult to conceive any membrane to be endowed with such immense powers of expansion as would be required for it to afford a covering to the whole pollen tube, lengthened as it often is to such a great extent in its passage through the style Thus in *Crinum amabile* the pollen tube has to pass through a space 1875 times the diameter of the pollen grain before reaching the ovarium In *Cleome spinosa* 2719 times In *Oxyanthus speciosa* 1489 times the diameter of the pollen grain, and in *Colchicum autumnale* 9000 times Pollen tubes are frequently met with of considerable length on parts of the flower distant from the stigma, proving that the stigmatic fluid is not essential for their growth, although it doubtless favours it

I am of opinion, therefore, that pollen tubes are growths and not mere elongations of the intine, and that as they grow a vacuum is formed within them, into which the fovilla passes At the same time, I do not mean to deny the fact of the intine being extensible, it is no doubt highly so, as proved by the great length of the pollen tubes emitted under the action of dilute nitric acid in some cases

Were pollen tubes but mere extensions of the intine, it might with reason be expected that the size of the granules and consequent extent of the intine would bear some relation to the distance which they have to travel through the stigmatic tissue before reaching the ovary, and that the greater the distance the larger would be the pollen grains, but no such relation exists

I am at present inclined to regard the active molecular bodies in the fovilla, which have attracted so much the interest and attention of physiologists, as nothing more than particles of that fluid which have become separated into little masses or globules The fluid nature of these particles is proved by their great diversity of form and size, by their transparency, and by their trailing, or "tailing *," as they pass along the surface of glass. Again, the internal membrane of the pollen grain of *Strelitzia humilis*, when denuded of the extine, presents a cellular appearance, which is owing to the presence of numerous globules of various sizes contained in the fovilla, of which, in this instance, it appears to be entirely composed, and which are seen through its transparent envelope. I could not detect any other bodies but these globules, which I regard as fluid for the reasons just given. The application of iodine to the fovilla, contrary to expectation, produced no effect, and a solution of potash but little apparent results.

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* "Tailing" is a term used by druggists to signify the elongation of form which the globules of impure quicksilver undergo in passing over paper

I look forward to another opportunity of making more extended observations upon the nature of these so-called molecules.

Being anxious to ascertain whether stimuli would produce any effect upon the pollen, various solutions were applied with a view to determine this point. The results following the various applications employed were as follows:—solutions of the mineral acids, whether sulphuric, nitric or hydrochloric, all occasioned, with more or less degree of force, the protrusion of the pollen tubes. Their mode of action is not very clear, but it may be that they produce *some* astringent effect upon the outer coating of the pollen grain, so as to cause the principle of endosmosis to operate with greater power. Sometimes these acids, and more particularly the dilute sulphuric acid, rupture the inner membrane, and then the fovilla escapes from its interior, but most frequently the pollen tubes are emitted, covered by the intine, which remains entire, and it is to explain this protrusion of them that the above explanation is offered. The concentrated sulphuric acid almost always destroys the intine, and frequently also blackens and chars the extine. A solution of the nitric acid, in the proportion of two of the strong acid to three of water, is perhaps the best application for occasioning the emission of the pollen tubes, but it is as well to have solutions of all the acids of various strengths, for where one fails another will often produce the desired effect. The action of the hydrochloric acid is weaker than that of either of the others. Solutions of *æther* and *sal volatile* produced a marked effect. When either of these were allowed to fall from a glass on the pollen, its granules became distinctly agitated and moved about with considerable velocity, sometimes for the space of two or three minutes. A like effect, but to a much less extent, resulted from the employment of tincture of cantharides, tincture of capsicum, proof spirit, solution of nitrate of silver in proof spirit, and essence of ginger, while liquor ammoniæ and potassa produced no result It is to be remarked, that all those applications which occasioned any motion of the pollen contained a greater or less proportion of spirit in them, and that the most volatile liquids, æther and sal volatile, gave rise to the most marked effect This very obvious motion of the pollen granules is certainly not to be referred to any action of the irritants employed upon them, but to currents in the fluids That this is the real explanation to be given of the phænomenon is satisfactorily proved by the two following facts 1st If a small quantity of either æther or sal volatile be allowed to remain for a few minutes in a watch-glass and the pollen be then added, no motion will follow, the more volatile portion of these liquids having evaporated, and 2nd, the particles of flour will be equally affected by the application of the before mentioned solutions Water also will sometimes cause the emission of the pollen tubes, the principle of endosmosis being called into operation This emission of the pollen tubes is not the act of an instant, but occupies an appreciable time, producing the impression on the mind of some continuous force operating in occasioning it, such as that of endosmosis already referred to

The extreme care taken by nature to ensure the fertilization of the seed, a process so essential to the well-being and almost the existence of man, is very striking, and some of the beautiful provisions by which this important effect is so constantly brought about, it is my intention now to notice First, then, the lining membrane of the anther, as pointed out by Mirbel in 1808, is composed of cellular tissue of a fibrous character, which forms an innumerable quantity of little springs* which are highly elastic, and when dry contract and pull open the valves of the anther, allowing the pollen to escape This elastic tissue is deprived of its fluid by means of the endosmosis carried on by each individual grain of pollen, and this exhaustion of its fluid is only completed at the period of the maturity of the pollen Thus by this unerring contrivance, not alone is the precise period of the opening of the anther, viz at the perfection of the pollen, provided for and determined on, but it results from it also, that the pollen only should be exposed in the weather most suitable for the performance of its function, that is, in dry weather The injurious effect of a continuance of rain in destroying the fertilizing power of the pollen is well known, and is to be explained by the rupture of the granules from the great quantity of water imbibed by endosmosis, and this consequence of wet would be attended with more serious results were it not for another wise and effectual provision The individual flowers composing a bunch, as well as the different bunches of a plant or shrub, come into blossom at successive intervals, the order of their expansion depending mainly, I believe, upon the position of the flower, whether it be in a more direct line or not for the accession of sap, on the size of the peduncle, as well as on the order of the development of the flower buds themselves* thus, if the pollen at one period be destroyed, it is soon replaced by the unfolding of more blossoms and bursting of anthers this constitutes the second means by which the efficiency of the pollen is ensured We find a third in the position of the stamens in reference to the pistil, which they often surround, embrace, or overhang, so as to render the application of the pollen to the stigmatic surface a matter of certainty

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* This peculiar arrangement of the fibres of the lining membrane of the anther is very plainly seen in the common nettle

Again the filaments of some anthers are furnished with elastic joints, which at a certain period, that is, when the pollen and stigma are in a fit condition, contract and start towards the pistil with a jerk, dispersing the contents of the anthers around them by the suddenness and violence of the motion I may perhaps under this head refer to two instances of irritability, which I have never seen mentioned in books, and which are certainly not generally known The first occurs in *Cornus canadensis* the corolla of each flower, a number of which are contained in a common involucrum, consists of four segments, these for some time are folded over the other floral organs and meet in a common central point, where they cohere by means of some secretion Towards their tips, on what is the upper surface, while thus closed, arises a long spine or hair The stamina are also four in number, and arise from the top of the calyx in the intervals between the petals, and at about half their length are bent inwards towards the pistil at a very acute angle, being retained in this position by the corolla which infolds them The base of each petal, as well as the angle of inflection of each filament, are furnished with an elastic joint, so that if one of the spines be slightly touched, not only does each segment of the corolla fly back, but the stamina, the restraint being removed from off them, start up, scattering the pollen of the anthers around them, some of which, it is beautiful to observe, in viewing this phænomenon under a low power of the microscope, invariably alights upon the stigma, and is there retained by means of the secretion with which it is furnished

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* The cause of the irregular ripening of many kinds of fruits and seeds admits of a similar explanation

If the joint of the filament be touched where it protrudes between the petals, no such effect as I have described will be produced, but the moment the hair is touched it takes place, now the presence of these hairs affords a very interesting instance of design They are connected with the joint of each petal by means of a raised line of elastic tissue which runs along their centre, and which doubtless serves to convey the impression or shock, imparted to the hairs most frequently by means of insects, to the joint, causing it to contract, the dispersion of the pollen and consequent fecundation of the ovule being thereby rendered more certain

The second instance to which I shall refer is witnessed in the common stinging nettle, *Urtica dioica* the number of stamina in this plant is likewise four, these are inclosed in a chalice or cup composed of four sepals, and the filaments are coiled inwards, on the reflection of these sepals, or on the occurrence of any shock, the filaments disengage themselves, and not merely straighten, but turn as much outwards as they were previously coiled inwards, the pollen being scattered, as in the former case, around them If the filament of each stamen be examined with the microscope, one surface of it, that is, the one which formed the concavity before its disengagement, but after, the convexity, is observed to be ringed, in the same way as the elastic spring of the sporangia of Ferns An analogous instance of irritability occurs in *Parietaria*, an allied genus*

The stigmata of some plants, as for example of *Pavetta Caffra*, the *Campanulæ* &c, extend so much beyond and above the anthers, that it is difficult to conceive in what way the pollen can reach them, but observation affords an explanation of the means at the time of the bursting of the anthers the stigma is on a *level* with *them*, and, apparently stimulated by contact with the pollen grains, subsequently rises up, carrying with it in its progress a quantity of the pollen

Moreover, the application of the pollen to the stigma is rendered more certain by a cause, which, when not rightly considered, may appear trifling, but which, in its results, is far from being so I allude to the agency of insects, and of these, especially to the *Aphides*, and our benefactor the Bee, that busy labourer for man, who in rifling a flower of part of its sweets, yet in doing so confers upon it the means of its perpetuity by dispersing the pollen around, some of which never fails to reach the stigma To many insects the pollen doubtless forms an important article of food, as does also the honeyed secretion found in so many flowers, and are both the inducements which bring them so many visitants The chief use of honey in the œconomy of a plant I conceive to be to allure insects for the purpose referred to

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* I now know that *this second* example of vegetable irritability *or elasticity of tissue* is alluded to in Lindley's 'Natural Arrangement, and also in Henslow's 'Descriptive and Physiological Botany

The last provision to which I shall advert, consists in the amazing number of pollen granules produced by most flowers In a single blossom of *Leontodon Taraxacum* I counted no less than 243 600 pollen granules A flower of Pæony furnishes on an average 174 stamina, each containing 21,000 granules, these multiplied together give a total of 3,651,000, and in an entire Rhododendron plant the pollen grains amounted to the wonderful number of 72,620,000 This last result was arrived at by computing the number of anthers in each flower, with the contents of one, and the number of flowers and bunches Great as these amounts are, they sink into comparative insignificance when contrasted with the myriads produced by a single forest tree. A bulrush gave 144 grs by weight of pollen Immense as the quantity of pollen is, provided for the fertilization of each flower, it is yet all necessary, so much being destroyed by various instrumentalities, to ensure the certainty of a process, the failure of which would be attended with such calamitous results Nature is seldom uselessly prodigal of her resources

It is interesting to observe the relation which frequently exists between the quantity of pollen and the more or less direct means of its application to the stigma, this relation, however, is modified by the number of ova to be fertilized Upon this subject I hope shortly to make some detailed observations

Various particulars referred to in the foregoing pages will be exhibited in the figures which are to accompany the second portion of this communication

[To be continued]

XIV —*Indian* Cyprinidæ By JOHN M'CLELLAND, Assistant Surgeon Bengal Medical Service

[Continued from p 46]

24 THE Opsarions are *Cyprinidæ* that live upon other species of their own class, they are no less remarkable for the peculiarity of their colours than for their remarkable structure and habits Instead of the longitudinal stripes of the Perilamps, they are charactelized by transverse bands or spots, having a tendency to form cross bars on the sides The analogy between the structure and character of the Opsarions

and *Felinæ* has already been referred to (16.) Why the former should present similar external markings to those which belong to the most destructive types of quadrupeds and birds, cannot well be accounted for on other principles than those of symbolical representation, by which an uniformity of design appears to extend throughout all the infinite forms in the animal kingdom. As an ignorant confidence in this or any other doctrine would be as absurd as a denial of anything else with which we are imperfectly acquainted, the only way in which we can evince our respect for those who have opened so vast a field for inquiry is, to imitate their industry, leaving our views to be slowly formed and matured with the progress of inquiry—the only way in which sound or useful results ever were or can be elicited in scientific pursuits.*

Green appears to be the characteristic colour of the markings on the sides of Opsarions, as blue or purple forms those of the Perilamps; and those Opsarions that are not either marked with transverse green bars, or oblong spots of the same colour transversely placed with regard to the body, are covered with a silvery pigment similar to that of the Leuciscs.

25. In consequence of the important connexion between colour and structure here pointed out, I am in some doubt as to the nature of four small species described by Buchanan†, and figured in the collection of his drawings at the Botanic Garden. Two of them have been figured in the 'Gangetic Fishes,' and one a second time in Hardwicke's 'Illustrations', but in the published figures, the peculiarity of the colours to which I allude, and which seems to have been preserved in the original drawings, has been overlooked. They have the form of Cirrhins, but they are each marked with a dark spot at the end of the tail, and the colours of the back descend partially across the sides in bars as low as the situation of the lateral line. I have added the species in question to the Cirrhins as *Cirrhinoids*, until we know something more of them. Should they prove, from the length of the abdominal canal, to belong to *Sarcoborinæ*, as their colours indicate, they will occupy a place between the Opsarions and the Loaches.

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* Nothing is more easy, or more common because it is easy, than to announce as discoveries the startling results of immature inquiry into obscure subjects; yet when we consider the comparatively small amount of real discovery solely attributable to Newton, compared with the extent of his application, and how seldom a Newton appears, we should always receive with suspicion the supposed discoveries of persons, who, from their frequent appearance in public, and the number of their occupations, argue a sad deficiency in all those qualities essential to the promotion of any science.

† *Cyp. Dero*, Buch. Gang. Fis., pl. xxii. f. 78. *Cyp. Morala*, id., pl. xviii. f. 91. *Cyp. joalius*, id. op. cit. 316. *Cyp. Pausius*, id. loc. cit.

26 The third subfamily, *Apalopterinæ*, consists of the old Linnæan genus *Cobitis*, the *Anableps*, *Pœcilia*, *Lebias*, *Fundulus*, *Molinesia* and *Cyprinodons*, as well as two other genera, *Platycara* * and *Psilorhynchus*, to be described in a subsequent part of this paper These fishes are all remarkable for their long cylindric bodies, covered with a slimy mucus, the absence of spines in any of the fins, and the shortness of their alimentary canal

Mr Gray has recently separated the Loaches with suborbitar spines from those that are without these singular organs I have endeavoured to find further reasons to strengthen this division, a single character being insufficient to distinguish a natural group without some more general reference to habits and structure Not having been successful, I am obliged to resort to another arrangement, which appears to be more natural, and at the same time equally obvious, the caudal of the one subgenus (*Cobitis propria*) being entire, and that of the other (*Schistura*) bifid, or divided into two lobes, as in the ordinary Cyprins Colour is here a no less important guide than we have found it to be in *Sarcoborinæ* Green, disposed in bars and zones crossing the body, characterizes all the *Schisturæ* except a single species (*Botia grandis*, Gray), in which the colour is green, with oblong light yellow spots, or rather short interrupted streaks, irregularly disposed in all directions

The true Loaches (*Cobitis prop*), on the contrary, are all brown, inclining in different species to red or yellow, disposed in nebulous blotches or obscure bars having a transverse tendency

27 The structure of the digestive organs in the Loaches and *Schisturæ* does not appear to be very different, but in the latter the intestine seems to be somewhat longer than in the former, exceeding in the one genus the length of the body, while in the other it falls short of this In both the stomach is a small lunate sac, placed crosswise with regard to the body, with both orifices in the front, thus differing in this peculiarity from all other *Cyprinidæ* that I have examined The mouth is small, and placed in the lower surface of the head, and surrounded by minute cirri Besides the difference in the caudal fins, length of intestine, and colour, in the two subgenera of *Cobitinæ*, the body in *Schistura* is often arched above and below, and compressed, the same as in *Cirrhinus* and the generality of Cyprins, but in *Cobitis pro-*

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* Named by Mr Gray as Buchanan's *Balitora*, which rather corresponds with my *Psilorhynchus*, *Psil variegatus* being Buchanan's *Cyprinus Balitora*

pria, or true Loaches, it is almost cylindrical, and generally very long. Some of the *Schisturæ* are possessed of an air-vessel, placed as usual in the upper part of the abdomen, of an oval shape, and divided into two lateral cells by a longitudinal septum; but in *Cobitis prop.*, or Loaches with entire caudal, I have not found any trace of that organ in the ordinary position: but in different species that I have dissected, it is placed in a small bony case over the entrance to the œsophagus; this case consists of a single subglobular cell, although in the European species it has been found to be bilobate. In those *Schisturæ*, on the other hand, which are without the abdominal natatory bladder, I find the organ situated over the entrance to the œsophagus, as in *Cobitis prop.*, but formed of two small globular cells, joined together by an intermediate tube.

28. Having thus explained the general principles on which I have subdivided the family, it may be useful to examine how far the results are likely to correspond with those laws that have been laid down as the basis of natural classification. With this view we should first of all endeavour to ascertain the denomination of the family, or its relation in point of rank to fishes in general, but as this could only be done after analysis of the whole class, we can only attempt to form an estimate on the subject by comparing *Cyprinidæ* with what seem to be analogous groups in other classes, to which the philosophical views of Mr MacLeay, Mr Swainson, Mr Vigors, and other writers on the natural system, have been extended.

29. It might be unnecessary, in a communication of this kind, to offer any remarks on the general principles of the natural method of arrangement, as these are fully expounded in popular introductions that ought to be universally read, as well as in several papers that have been published within these last twenty years in the Transactions of the Linnæan and other learned societies, I may however remark, that in addition to those affinities by which animals are immediately connected, there are more remote relations, called relations of analogy, by which they typify or represent each other, "a principle which," as Swainson observes, "was in some degree perceived by Linnæus when he compared ruminating quadrupeds to gallinaceous birds[*], both of which evince the greatest intelligence, docility and contentment under the domestication of man." Appendages to the head, whether in the shape of horns, crests, or fleshy protuberances, and the property of affording whole-

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[*] Such analogies were, as Mr MacLeay has shown, known to Aristotle, by whom, however, as well as by all subsequent writers up to the time of Mr MacLeay himself, they were mistaken for affinities.

some and nutritious food, and otherwise contributing to the ease and support of man, are, according to Swainson, the chief attributes of the type to which the above analogy refers

30 The Elephant, horned cattle, domestic poultry, &c, are common instances of the type alluded to, and if we compare their properties in their respective circles with the *Cyprinidæ* in the order of abdominal Malacopterygians, we may venture perhaps to look upon that family as the equivalent in its circle to other rasorial groups in theirs

31 The mouth of *Cyp Calbasus*, Buch, is small, and directed downwards, the anterior lip is compressed by a pendulous muscular snout, to which four short muscular cirri, different from the nervous filaments of *Siluridæ*, are attached*, and the posterior lip is fixed to the ligamentous union of the transverse apophyses of the lower jaw In the Cirrhins the lower jaw is composed of two short branches or bony limbs, obliquely inclined towards each other from their articulation to the blunt apex of the jaw, where they are united by ligaments instead of symphysis at the approximation of a slender apophysis from each side Figs 4, 5, 20, 21, plate 54, show the under side of the right ramus of the lower jaw (natural size) of four species, *a*, being the point of approximation with its fellow at the chin, and *b*, the articulating extremity behind

32 This structure is evidently adapted to the habit of collecting fruits, seeds, and other soft substances from the muddy and sandy bottoms of indolent streams, in which loose detached objects of the kind are most likely to occur, and where they may be easily collected, without bodily effort, by means of these soft pendulous and prehensile organs attached to the lips If to these characters we add the great size of the species compared with the rest of the family, and the plain dusky colour of the Cirrhins, their analogy to the proboscidian types of quadrupeds seems almost complete But there are still other remarkable points of resemblance between the Cirrhins and rasorial forms among the quadrupeds, in the deficiency of teeth, and the weakness of the union of the two limbs of the lower jaw

33 In the Elephant this jaw is only formed for grinding such substances as are introduced to the mouth by the proboscis,

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* The cirri of *Cyprinidæ* are soft, and capable of being contracted and elongated, as well as the loose muscular appendages of the snout to which they are attached, particularly in the genus *Cirrhinus*, Cuv, but in *Pimelodus aor*, Buch, and most of the *Siluridæ*, I find the cirri are flat and cartilaginous, with a groove on either edge for the protection of a large nerve, an artery and a vein A *cirrus* so constructed is incapable of muscular action, and is strictly an organ of sense only, and not of prehension as in *Cyprinidæ*, and ought to be called a filament

there are no cutting teeth, the use of these in gathering food being superseded by the trunk. In all animals possessed of such an organ, prehensile and cutting teeth appear to be less prominent according to the degree of its development; of this we have instances in the Tapirs and Edentates. In the *Sarcoborinæ* the incisors and prehensile teeth are represented by a formidable knob on the symphysis of the lower jaw; and in the *Pæonominæ*, where even this symbol is wanting, we find such of the genera as are without strong muscular appendages to the snout, furnished with a cartilaginous rim to the mouth, which in some, as the Gonorhynchs, is confined to the edge of the lower lip, as a covering or defence when employed in detaching their peculiar food from the rocks to which it is fixed, and may for this reason be considered as the last semblance of a structure equivalent to cutting teeth*; but in the Cirrhins even this is quite deficient. Nor does the analogy between these fishes and proboscidian quadrupeds end here: the presence of cutting teeth implies a strong solid union of the two bony limbs of the lower jaw at the symphysis for their insertion; but in the Edentates and Elephants the symphysis is remarkably feeble, the two sides of the jaw being nearly separated by a deep fissure, almost detaching its limbs from each other, as actually occurs in the Cirrhins, with which I include Labeos, which are also furnished with similar prehensile organs in the form of thick pendulous lips. So many corresponding circumstances between animals so remote from each other in the scale of affinity cannot be referred merely to coincidence, but rather to a law of symbolical representation, by which the same type appears throughout an infinity of forms in the several classes.

34. If *Cyprinidæ* be a rasorial group, as the above analogies of their most perfect forms with rasorial quadrupeds would seem to indicate, the same relation should appear on contrasting them with other classes, the corresponding points becoming more striking or faint in proportion as the groups with which they are compared are contiguous or remote from them; therefore, as birds are nearer to fishes than quadrupeds, the comparison of analogous types between these classes should afford more striking results than those I have cited.

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* Mr Evans pointed out to me a peculiarity, for which he could see no object, in our skeleton of an Indian Rhinoceros, consisting of two minute incisors scarcely larger than those of a Rabbit, and hardly projecting from the alveolar; yet these teeth, so small as to be utterly unfit for any useful purpose, are found in every individual of the species. We can only regard these, and all such organs, of which the animal kingdom presents innumerable examples, as the characters by which nature distinguishes her various types.

The most remarkable characteristic of rasorial birds is their shortness of wing, terrestrial habits, and consequent strength and size of their legs, which are formed for the principal support of the body, and in some almost supersede the use of wings It may be thought difficult to find among fishes a terrestrial type, but as water is the natural element of this class, so the ocean is its metropolis, and those kinds that are confined to rivers and the interior of continents may be safely looked upon as more terrestrial than the rest, and consequently so far equivalent in their habits to rasorial birds, and while there is no instance of rasorial birds possessed of aquatic habits, or, as Swainson observes, "frequenting water or even its vicinity*," so no species of *Cyprinidæ* is known to belong to the sea In India the *Cyprinidæ* are exclusively confined to fresh water, mostly keeping beyond the influence of the tides, thus evincing a propensity for land analogous to that of Rasores

35 There is perhaps no point better settled in comparative anatomy, than that the pectorals of fishes represent the upper extremities of the higher classes of animals, short pectorals may therefore be said to be equivalent to short wings in birds, but it is a question of much interest to determine fully how this applies to the case before us, and if it is to be relied upon as a true analogy

In the Frog and several reptiles the scapula has been found by Cuvier and Geoffroy to be composed of two osseous pieces, agreeing with the two upper bones of the posterior frame or jamb of the branchial aperture in fishes, and a third or lower bone assists in forming a girdle to which the pectoral fins are fixed in *Siluridæ* and most fishes of the same order, with the exception of the *Cyprinidæ,* and particularly the herbivorous section of the family (*Pæonominæ*) These bones were found by the most satisfactory analysis to represent the humerus, or bone which gives support to the third row of quill-feathers in birds Below this bone there is a stylet, which in Cyprins is *merely rudimental* It was found by Cuvier to represent the ulna and radius, or in other words, to be equivalent to the cubitus or bone which sustains the secondary quills in the wings of birds

36 Thus two bones, which in birds constitute the larger portion of the wing, may be said to be almost deficient in herbivorous Cyprins, though they are more developed in many species of the carnivorous section of the family, and still more complete and uniform in other families of the same order, as *Siluridæ*

37 It is hardly necessary to enter into further analysis to

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* Geog Dist and Class of Animals, p 2;9

prove that the pectorals of *Cyprinidæ* in general, but particularly of herbivorous Cyprins, are less complete than those of neighbouring groups, for we are at once struck with the fact on observing the small size of the pectoral fins in all our *Pæonominæ*, and the slenderness of the rays of which they are composed, while the large clumsy rays of the ventrals, and the strength of these fins, are circumstances that cannot be overlooked, and which, when viewed in comparison with the strong and fully-developed legs of Rasores (34), supply all that is essential in the analogies between the groups in question

38 In the most carnivorous species of *Sarcoborinæ*, on the other hand, and especially in some of the Opsarions, as *O polioxus* and *O pholicephalus**, remarkable instances are observed of excessive development in the pectoral fins, and this is always, as far as I have seen, attended with a proportionate want of size in the ventrals, which are so slender and small in this genus, and their structure so delicate, as to render it hardly possible to conceive that they can be of much use in aiding the movements of the body Now the widely-cleft mouth or beak, great breadth of wings or pectorals, obsolete ventrals or feet, are common to Opsarions and Fissirostres, so that the first would thus appear to be a natatorial type of *Sarcoborinæ*, corresponding with that type in the order of perching-birds To this, however, there is some objection, for if the *Sarcoborinæ* represent the *Feræ*, the most carnivorous genus of the subfamily (which Opsarions would seem to be) ought to represent the *Falconidæ*, in which there is only one genus (*Gypaetus*) remarkable for short feet and great breadth of wing, but the cruel habits and voracious appetite of the Opsarions go to establish this last as the true analogy, this, however, as well as many other points must remain to be decided by further inquiry In the mean time we may be justified in the conclusion, that the *Feræ* among the Mammalia, and the *Falconidæ* among birds, have their representatives among the *Cyprinidæ*, and that the same type in each of the three groups seems to possess certain corresponding characteristics which may distinguish them from all adjoining groups, and that in describing these characters the same terms are as applicable to the one as to the other, which is quite sufficient to prove their corresponding analogies

39 It may be objected to by those who have not paid much attention to the subject, that detached comparisons of this nature are of little value, still they are important, as the means of directing attention to characters that would other-

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* Tab 47, f 2, 3

wise be liable to be passed over unobserved, I am therefore disposed to pay little regard to such objections The number of species and groups are now so much multiplied in every department of natural history, that detached descriptions are daily diminishing in value, and besides, it is so easy to make a new genus if not required to show our reason for doing so, that we need not be surprised that it should now have become a regular trade, and that many acquire a temporary fame with the unthinking part of mankind by the practice

40 The first test of a natural group is the circularity of its contents To ascertain whether the affinities of the *Cyprinidæ* are circular, it is necessary to recollect that the herbivorous Cyprins are characterized by their plain colours and great length of intestinal canal, which varies from six to twelve lengths of the body in the different groups, those with the shortest intestine (the Barbels) being in the centre of the sub-family, it follows that the two extremes must meet, or show a tendency to approximate or close The herbivorous Carps are united to the *Sarcoborinæ* by means of the Gonorhynchs and Systoms, and show, like the last, a tendency to form a circle of themselves, though it is probable that the group is yet far from being complete The *Sarcoborinæ* and the Loaches are united by two new types, the *Platycara* and *Psilorhynchus*, and the *Schistura*, in addition to approximating to the *Platycara*, unites, or shows a tendency to unite, both in form and habits, with the *Pæonominæ*, the group with which we set out, thus exemplifying the first principle of natural classification, namely, that every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return again to that point, thereby forming a circle*

41 The second test of a natural group relates to the number of its types On this point there exists some difference of opinion among writers on the natural system, which their profound inquiries are now doing much to remove It is a question which, to understand sufficiently for practical purposes, requires an extensive knowledge of natural history, and a mind somewhat more imbued with the spirit of philosophy than has hitherto been considered requisite in those who ventured to name new genera It has already been said that the lower jaw of the Labeos agrees with that of the Cirrhins, in being formed of two bones articulated behind to the anterior process of the preoperculum, and that in front a transverse apophysis is given off on either side, so as to meet nearly in the middle, where they are united by ligaments and muscles at the chin, which is square, with a fissure in the middle

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* Swains Nat Class and Geog Dist Anim, p 221

The lower jaw of the Barbels is composed of two longer limbs (fig 6, plate 54) articulated behind as in the Cirrhins, but without transverse apophyses in front, where the two bones are united by symphysis, or close union, firmly cemented as it were with cartilage

In the Gudgeons the chin is rounded horizontally, without the depression in the middle observed in that of the Cirrhins, or the acute lengthened apex of the Barbels, and is composed of a solid bony rim, formed of a transverse process directed from each corner of the mouth to the centre, where it is firmly united to its fellow by symphysis at the chin, at the corners of the mouth these transverse processes turn backwards at right angles (as in *Cyp bata,* Buch, fig 3, plate 54), and sometimes at still greater angles, as in (fig 2, plate 54) *Cyp mrigala,* Buch This last process is articulated behind to the anterior process of the preoperculum, and corresponds with Cuvier's angular bone in the Perch

42 The angular transverse processes in this last form have every appearance of being two distinct pieces (*c* and *d,* fig 2, plate 54), consolidated in adults by a bony union at the corner of the mouth, yet formed from distinct centres of osseous deposit Now as these three forms are each attended with peculiar traits of character in regard to the nature of food and the manner of obtaining it, as well as in the structure of their digestive organs, we may be sufficiently justified in regarding them as characterizing three types, which, if we like, we may term primary This view is further supported by the fact, that to one or other of the three forms in question, variously modified, the lower jaw of all the Cyprins of this country may be referred In *Cyprinus semiplotus* (fig 1, plate 54) the angular process is merged into the transverse, the first being only distinguished by the pterygoid process (*c,* fig 1, plate 54), which we know, from all the other species examined, to belong to the angular limb (*d,* fig 2, plate 54), and not to the transverse process on which it is in this species placed, while the analogy to the type of the Gudgeons is preserved by an additional transverse bone being placed parallel to and in front of the first (*e, e,* fig 1 and 2, plate 51) Of the positive value of these characters, I may mention that *Cyprinus mrigala,* Buch, is indicated by Cuvier as a *Cirrhinus,* but proved by this method of analysis to belong to the Gudgeons (*Gobio prop*, J M), having, as well as the peculiar affinity here pointed out, the lengthened alimentary canal of that genus

Cyprinus prop, Cuvier, I suspect will be found, according to these principles, to agree in its natural affinities either with the Barbels or Cirrhins, as the length of the dorsal and the presence or absence of a spinous ray are scarcely sufficient distinctions even for a subgenus, and the Catastomi and Labeos of America will, I presume, be found to arrange themselves naturally with the Cirrhins

The lower jaw of the Gonorhynchs is composed of two limbs placed nearly parallel to each other, and, as in the Cirrhins, not united in front, but with this peculiarity, that the os hyoides is prolonged to the chin, at which situation the anterior extremities of the three bones are tied together with ligaments*

In the Opsarions, and generally throughout the *Sarcoborinæ*, the second form of jaw prevails, with the addition of being more acute at the symphysis, this form also seems to prevail in the *Cobitinæ*, but in these the bones of the jaw are soft and flexible The limbs of this organ are round and slender in *Cobitis prop*, but firmly united in front by means of two expanded apophyses, while in *Schistura* they are flat and obliquely inclined to each other, so as to form, by means of their inner edges, a lengthened symphysis

43 Thus we appear to have three primary types the first distinguishes the Cirrhins, Labeos, and probably Catastoms, a second is peculiar to the Barbels, Opsarions, and numerous other genera, and a third is seen in the Gudgeons From these three types being so prominently developed in the *Pæonominæ*, while one principle chiefly seems to run through all the *Sarcoborinæ*, it is perfectly legitimate to conclude, even from this circumstance alone, that the former should be the most perfect group of the two, and that its species should consequently be endowed with more diversified instincts, hence, although a vegetable regimen is the great characteristic of the *Pæonominæ*, still many of the species are omnivorous, and this is to be expected, especially among the Cirrhins and the true Carps (*Cyprinus prop*, Cuv) The Barbels, however, as well perhaps as the Breams, which appear to be peculiar to Europe, seem to partake more of carnivorous habits, and therefore must be held as the subtypical, while the Cirrhins are the typical†, and the Gudgeons and Gonorhynchs, from their possessing in the greatest perfection the single instinct for a tendency to which the *Pæonominæ* are most remarkable, viz subsisting exclusively on a vegetable regimen, are as unquestionably the aberrant forms of *Pæonominæ* on the other hand, the rapacious habits of the *Sarcoborinæ* mark them so con-

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* Vide Journ As Soc Beng, 1835, p 40, where I described this structure in *Gonorhynchus petrophilus*

† The Cirrhins being the most perfect forms of a typical group, are strictly, in the language of Mr Swainson, *pre eminently* typical

spicuously as a subtypical group, corresponding as they do with the habit of that group in devouring other animals, that it is unnecessary in this place to offer a remark in support of a fact so plain

44 The consideration of the third or aberrant group in *Cyprinidæ* involves some points which will not be so clear to those who have not studied the principles of natural classification This group should possess three types, and these should be so related as to form a circle of affinities among themselves This property has suggested the following proposition to Mr Swainson, which tends to reconcile some diversity of opinion that formerly prevailed as to the number of primary types —" The primary circular divisions of every group are three actually, or five apparently" The three aberrant types are named by Mr Vigors ('Linn Transac,' vol xiv) from the corresponding groups in ornithology, natatorial, suctorial, and rasorial* The third type I find to be represented by the Loaches, but before we enter into a consideration of that part of the subject, it is necessary to point out the two first types, which I have already only alluded to, this I must do by entering into more particulars than may seem to be necessary

45 Buchanan, in defining his ninth division of the old genus *Cyprinus*, which is composed of Gonorhynchs, as I have already pointed out, gave them the barbarous name of *Garra*, and compares their habits to those of the Loaches, and observes that they are called *Balitora*, or sand-diggers, by the natives, a name, I may observe, which in Assam, and I presume also in Bengal, is applied to Loaches only Indeed the Gonorhynchs, or *Garra* of Buchanan, are peculiar to mountains, from whence they are driven down during floods, and do not extend beyond the rapids that skirt their base, so that they can scarcely be said to be entitled to any Bengal name In this group Mr Gray detected a new genus to which I wish he had given a more appropriate name than *Balitora*, for independently of the species being different from any of those described by Buchanan, and supposed by him to be the *Balitora* of the natives, Mr Gray's genus is peculiar to mountain-torrents, the beds of which are usually rocky rather than sandy for this reason, as well as from the fact of the *Balitora* of Gray forming a new type, distinguished by a flat head and

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* As these terms have been applied conditionally by Mr Swainson to *Mammalia*, I need make no apology for following the example of so good an authority in applying them to fishes Indeed I have been guided entirely by the views of Mr MacLeay, as exhibited in the 'Linnæan Transactions, and the works of Mr Swainson, from beginning to end of this paper

other remarkable characters, I propose for it the generic name *Platycara*[*] Several specimens of this genus, corresponding, I suspect, with the spotted species of Gray, *P maculata*, plate 49, fig 2[†], were brought down from Bouton by Mr Griffith, but they were unfortunately in such a decayed state when opened that we have been unable to obtain from them a very full specific description. I have however, from these specimens, been able to satisfy myself on other points connected with their structure, and find not merely that they are distinct from the Gonorhynchs (*Garra*, Buch), in consequence of their short fleshy abdominal tube, which does not, including the stomach, exceed the length of the body, while that of the Gonorhynchs is equal to eight lengths of the body, but that their broad and blunt head is more like that of a *Silurus* than a *Cyprinus* Their character is rendered still more remarkable by the great breadth and position of the pectorals, situated almost beneath the eyes, and the fleshy pedicles or arms on which they are placed are decided analogies to natatorial forms If we compare the characters of the *Platycara* with those of the natatorial types in the other classes, we are struck with the analogy—" a blunt truncated muzzle, an obtuse head with strong jaws for seizing animal food " The short intestines of the *Platycara* prove their habits to be carnivorous, and though the mouth is not very large, the jaws are remarkably strong, composed, as in the Gudgeons, of two limbs soldered in the middle, but much stronger than in the instance referred to Among birds, the Owls, the natatorial group of Raptores, and the Fissirostres in the circle of perchers, as well as most of the Natatores, are distinguished above other birds for their breadth of wing, and the blunt or flattened form of the rostrum or the head, as has been proved by the philosophical analysis of the class by Vigors and Swainson[‡]

46 For the next or suctorial form (plate 50, fig 1, 2) we are

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[*] From *platus*, broad, and *kara*, the head

[†] From the importance here given to these species as forming a new type, I have transferred the two figures from Hardwicke's 'Illustrations,' in which there is no description of them, to plate 19

Since the above was written, the collectors employed by my friend Mr Griffith in the Kasyah mountains have obtained an additional species, and as their liberal employer has no object to serve beyond the interest of science, he has freely permitted me to make use of this or any similar object of zoological interest contained in his collections The species alluded to, *P nasuta*, is described in Prinsep s Journal of the Asiatic Society for November 1838, plate 55, fig 2 See also plate 57, fig 2 of this paper in this species the pectoral pedicles are very slightly developed

[‡] The *Pœciliance*, Schn , to which I have added a subgenus *Aplochelus*, as well as the adjoining genera with flat heads and teeth, I also refer to the same type, plate 12, fig 2, 3, plate 55, fig 1

indebted to two drawings in Buchanan's collection, which are marked "*Stolephorus*," but the Stolephore (*Engraulis*, Cuv.) or Anchovies belong to the *Clupeidæ*, a family remarkable for its narrow or compressed forms. The two figures referred to are not compressed nor sharp beneath, so that they could not belong to the genus Buchanan had in view when he named them on the drawings, and this mistake he seems afterwards to have corrected, as the same two species appear unquestionably to be those described in the 'Gangetic Fishes,' p. 347–8, under the names of *Cyprinus Sucatio* and *Cyp. Balitora*.*

The muzzle of these species is remarkably flattened and thin, but there is nothing remarkable about the pectoral fins; and the eyes, instead of being placed on the upper surface of the head, as in *Platycara*, are situated on its edges; the mouth is remarkably small, placed far behind the long and thin muzzle, without any appearance of cirri, as in the Loaches, to which Buchanan supposed them to bear a resemblance. This genus, which appears to be the suctorial type, I propose to name *Psilorhynchus*.† The peculiarities just noticed, as well as the position of the eyes, which are far back in the head, as we see in the Moles, Ant-eaters, and other analogous types among quadrupeds, together with their well-formed and fully-developed fins, are indicative of powers of rapid motion, such as distinguishes the Humming-birds, Cinnyris, Waders, and other suctorial types in the same class. Unfortunately we are not acquainted with the habits of the two interesting species under consideration, further than that they were obtained by Buchanan in the northern parts of Bengal, to which they have been probably swept from the mountains. The information to be derived from their intestines is however of the less importance as affecting their type, as they would be equally suctorial whether they derived their food from the juices of plants or from shell-fish or ova.

[To be continued.]

XV.—*Notice of a hitherto undescribed character distinctive of the Sexes in certain* Lucanidæ. By J. O. Westwood, F.L.S.

During the late visit of Professor Burmeister to London, he mentioned to me, whilst looking over my collection of entomological drawings, that a Brazilian insect therein represented, and which had been regarded by the Rev F W Hope as a species of *Pholidotus* (*Ph irroratus*, H, Trans Zool Soc [*]), and by myself as constituting a subgenus of *Pholidotus* (*Scortizus*, W, in Ann d Sci Nat, 2nd Ser t i p 119), was naturally referable to the group of *Lucanidæ* typified by *Figulus*, MacL (consisting of the genera *Figulus*, *Nigidius*, *Cardanus*, W, and *Ceratognathus*, W), being, like those genera, furnished with a corneous hook at the extremity of the mando or internal lobe of the maxillæ My drawings comprised a representation of the maxillæ, and exhibited this hook, but in the plate published in the 'Transactions of the Zoological Society' the figure of this organ was omitted

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* It was probably Buchanan's descriptions of these species Mr. Gray had in view when he bestowed the name *Balitora* on the genus which I now call *Platycara*.

† From *psilo*, thin or attenuated, and *rhynchus*, a snout or beak.

The existence of two other Brazilian species of *Lucanidæ* closely allied to *Scortizus*, but of a narrower form, approaching that of the *Figulides*, and which also possessed a similar hook, appeared to confirm Dr Burmeister's views, although the general form of *Scortizus irroratus*, and especially the partially squamose surface of the body, seemed equally to bring it into connexion with *Pholidotus*

Having years ago discovered that the females of *Pholidotus* possess a similar hook[†], although it is wanting in the males, it appeared to me that this circumstance gave a more direct clue to the solution of the question than any other that could be offered The unique specimen, however, in Mr Hope's collection being a female, it became necessary to examine the other sex, and fortunately the valuable collection of Brazilian insects of Mr Miers afforded an example of both sexes, and on dissecting the male, I found, as I had anticipated, that its maxillæ were destitute of any corneous hook, thus proving the relationship of *Scortizus* and *Pholidotus* Being further anxious to ascertain whether this sexual distinction might not also exist amongst the Figulideous species, the specimens of which hitherto dissected might possibly have been females alone—whilst the males hitherto undissected might have been destitute of such hook, which latter is in fact the character assigned by Mr MacLeay to his genus *Figulus* in the 'Horæ Entomologicæ,'—I submitted all my exotic *Lucanidæ* (except those of the genus *Lucanus*) to the test of dissection, and the result has been the discovery of the existence of a similar sexual distinction in the genus *Lamprima*, whereas in *Nigidius* and *Ceratognathus*, W, the males of which are at once recognisable by the increased size of the mandibles, I found the maxillæ in this sex furnished with the hook as well as in the females All my specimens of *Figulus* and *Cardanus*, W, are also similarly provided with the hook, but I have not distinguished between the sexes, so that I cannot affirm, although I fully believe, that both sexes of those two genera are also furnished with a hook, and consequently that the description of Mr MacLeay of the genus *Figulus* is erroneous

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[*] *Lucanus maculatus*, Klug, in Nova Acta

[†] Mr MacLeay formed the female of this genus into the genus *Casignetus* in the 'Horæ Entomologicæ,' overlooking however this curious character, but suggesting its generic identity with *Pholidotus*

The genera in which I have found neither sex furnished with the hook are *Ceruchus*, *Platycerus*, *Ceratognathus*, W, *Syndesus* and *Rhyssonotus*

In *Lepidodes*, W, a new subgenus of *Lucanus* which exhibits several of the characters of *Pholidotus* and *Rhyssonotus*, I found the unique female in Mr Melly's collection to be destitute of a tooth

I also found the females of *Chiasognathus* and *Sphenognathus* similarly destitute of the hook, although, from their close relationship with *Pholidotus*, I fully expected to find that they possessed it

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XVI —*Insectorum novorum Centuria, auctore*
J O Westwood, F L S

*Decadis primæ Coleopterorum Synopsis**

Carenum Bon *C Spencii* Subopacum nigrum, tibiis anticis valde palmatis, elytris excavationibus rotundatis numerosis triplici serie (in utroque elytro) ordinatis spatiis intermediis elevatis Long corp lin 9 Nova Hollandia Mus Melly

Helota, MacL, *H Thibetana* Ænea lateribus cupreo tinctis, valde rugosa et punctata tuberculisque oblongis distincta elytris guttis 4-elevatis fulvis, antennis piceo-luteis femoribus fulvis apicibus æneis, tibiis fulvo piceoque annulatis Long corp lin 4 Habitat Thibet Mus Melly

Triplatoma†, Westw, in Griff An K *T apicalis* Nigra, lævis, prothoracis lateribus luteis macula oblongo ovali nigra, elytris fascia valde angusta ante medium alteraque pone medium (in medio interrupta) et subobliqua luteis apicibus ipiceque abdominis rufis Long corp lin 9½ Habitat Africa tropicali D Raddon Mus nostr *Elater cæcus* Fabr, Pal B Col pl 7 f 4 valde affinis

Sternotomis Perch (*Sternodonta*, Dej, Lap) *S amœna* Nigra, opaca pronoto maculis duabus mediis lateribusque scutello maculis lateribusque elytrorum viridi-lacteis maculis duabus in

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* Figures and detailed descriptions of these insects are prepared, and will be published hereafter

† Erotylidæ oblongæ palpis maxillaribus simplicibus

medio elytrorum maximis, alterisque duabus posticis elongatis et valde angustis Long corp lin 11—16 Habitat Africa tropicali D Raddon Mus Melly, nostr

SAPERDA, Fab , *S carissima* Brevis opaca, supra viridi lactea, pronoto vittis tribus brunneo-fulvis elytris fascia lata irregulari (in medio interrupta) ex humeris fere ad suturam ducta maculaque magna communi discoidali brunneo-fulvis his etiam maculis 10 nigris rotundatis ornatis Long corp lin 5 Habitat Africa tropicali Mus Raddon

PARISTEMIA, Westw (n g Longicorn Lophonocero et Pteracanthæ Newm affinis) Antennæ breves crassæ caput parvum prothorax utrinque obtuse spinosus elytra lateribus rotundato dilatatis apicibus simplicibus Palpi breves —*P platyptera* Nigra prothorace rufo utrinque striga e capite ad angulos posticos ducta nigra elytris fascia latissima postice angulata et fere ad apicem extensa rufa Long corp lin 12½ Habitat Africa tropicali Mus Raddon

LUCANUS, Linn , *L Dux* Ater, elytris nitidis capite utrinque rugose punctato, pronoto tenuissime punctato mandibulis longitudine capiti et thoraci æqualibus - valde curvatis intus (dentibus tribus subapicalibus exceptis) inermibus capite pone oculos utrinque obtuse spinoso, prothorace utrinque bispinoso angulisque posticis acutis tibiis anticis apice externo 3 dentato 4 posticis inermibus Long corp cum mandibulis unc 4 lin 2 Habitat Manilla D Cuming In Mus Brit Affinis *L bellicoso*, Lap at major et mandibulis basi intus inermibus Vix varietas *D Alcidis*

LUCANUS *DeHaanii* Æneo rufescens elytris pedibusque fulvescentibus capite maximo antice latiori, oculis vix septatis mandibulis elongatis, dente uno ante, alteroque pone medium tribusque subapicalibus intus armatis, antennis valde elongatis, clava 4 phylla 1^{mo} articulo clavæ maximo pronoto postice angustiori pedibus longis, tibiis anticis in medio 1-spinosis, 4 posticis inermibus Long corp cum mandibulis lin 19 Habitat Borneo Mus Melly Conf *L metallicus*, Bdv Voy Astrol

LUCANUS (S g nov LEPIDODES Corpus punctatum punctis albido-squamosis, caput ♂ magnum quadratum, mandibulis crassis, porrectis subrectis intus et ad apicem valde dentatis, prothorax subrotundatus lateribus crenulatis, oculis omnino septatis, antennarum clava 3 phylla tibiæ anticæ 5 dentatæ 4 posticæ inermes *L* (*Chalcodi*) ærato proximus) *L* (*L*) *rotundicollis* Purpureo-fuscus, subnitidus, capite thoraceque dense punctatis, punctis albido-squamosis, elytris tenuissime punctatis et squamosis Corpore infra ut supra colorato et squamoso Long corp lin 10—14 Habitat Nova Hollandia Mus Curtis et Melly

PASSALUS, Fab , *P fronticornis* Niger, nitidus, subcylindricus, clypeo in cornu longitudine capitis apice emarginato porrecto

mandibulisque porrectis, apertis, longitudine cornu clypei, intus ad basin multi-dentatis pronoto serie punctorum margine antico, parallela, punctisque duobus majoribus versus angulos posticos Long corp 1 unc Habitat Thibet Mus Melly

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XVII —*Notice of migratory Birds which alighted on, or were seen from, H M S Beacon, Capt Graves, on the passage from Malta to the Morea at the end of April* 1841 By Wm Thompson, Esq, Vice-Pres Nat Hist Society of Belfast

Having been favoured by my friend Capt Graves, R N, with an invitation to accompany him during the projected government survey of the island of Candia, I, with Mr E Forbes (who had received from the Admiralty the honorary appointment of Naturalist on the occasion), left Malta in H M S Beacon on the 21st of April The first port we sailed for was Navarino, for the purpose of watering the ship The passage occupied seven days It being just the period of the year when many species of birds which make Europe their abode only in the more genial seasons, were, after having passed the winter in Africa, crossing the Mediterranean to their summer quarters, we were often gratified by a sight of them, either passing, resting briefly on the rigging, or remaining sometimes so long as a day or more about the ship

The following notes were made upon the subject The prevailing wind of the day is set down the progress noted is what we had made at sunset

April 22 —Wind W, forty miles E of Malta An Owl alighted on the vessel and remained a short time I saw it very well and near, but could not be certain of its species Looking over the collection at the British Museum and referring to Gould's 'Birds of Europe' since my return, have not satisfied me on the point Other examples of the same species were seen on the passage, and afterwards in the island of Paros It seems to be the most common of the small migratory owls to the south of Europe, and I have little doubt is the species noticed by Sibthorp in his papers on Greece (published in Walpole's Memoirs) as the *Strix passerina* —Blue-headed Wagtail (*Motacilla neglecta,* Gould) two of these birds, both females, were about the vessel all day, and very tame, one of them flew into our cabin It was amusing to see them fly-catching on the deck, where they appeared to great advantage, and met with considerable success Their manner is, poking out the neck most ludicrously, opening wide the bill, and then—making the unerring dart at their victim[*]

Common Swallow (*Hirundo rustica*) Two remained some time about the ship, perching on the rigging, and hawking over the deck in pursuit of flies

April 23 —Wind S E , 80 miles from Malta, and 50 from Cape Passaro, the nearest land A Lesser Grey-shrike (*Lanius minor*), of which I had a near view several times , a Whitethroat (*Sylvia cinerea*), a Willow-Wren (*Sylvia Trochilus*), and a Black-headed Bunting[†] (*Emberiza melanocephala*), flew on board Two individuals of the *Motacilla neglecta* remained for some time in the vessel, as did a Wheatear (*Saxicola Œnanthe*) all day A House Marten (*Hirundo urbica*) flew into the cabin and was found dead shortly afterwards it had not met with any molestation on board The officers of the Beacon have frequently known birds of different species when crossing the Mediterranean thus fly into the cabin, secrete themselves and die A Quail (*Perdix Coturnix*) was captured on board, and appeared to be dying at the time

April 24 —Wind S E , 90 miles E of Sicily Syracuse the nearest land Several of the *Motacilla neglecta* flew on board , one of them entered the cabin very boldly, and entertained us much by its familiarity Persons passing in and out of the room frighted it not from fly-catching, in which it succeeded by running, leaping, or taking short flights at its prey this bird even alighted on ourselves and picked flies off our clothes

Two or three Hoopoes (*Upupa Epops*) came on board, rested for a short time, and proceeded on their flight , a Turtle Dove (*Columba Turtur*) did the same

A flock consisting of twelve Ibises (*Ibis falcinellus,* Temm) were seen first at a distance coming from the south-west, flew close past the vessel, and continued directly in the same course, or towards the north-east, until lost to view

April 25 —Wind N E , 58 miles from Calabria, the nearest land 135 miles from Mount Etna at sunset, when it was visible A Scops eared Owl (*Strix Scops*) was knocked down and captured just as he had clutched a Lesser Whitethroat (*Sylvia Curruca*), of which species two or three individuals came on board A Shrike (*Lanius* ——), which from the height it generally kept at I could not see well enough to distinguish its species, seized a *Sylvia Trochilus*, all of which it eat except the bill of the latter species, one which was taken by ourselves met with better treatment, and perching quietly on the finger was so carried about to feed on flies, which, when taken near to, it seized, never leaving the hand if the fly could possibly be captured from it. A female Golden Oriole (*Oriolus Galbula*), a Redstart (*Phœnicura ruticilla*), and a Lark (*Alauda* ——), of what species I could not be certain, came on board—the Redstart was caught. Several of the *Hirundo rustica* about the ship. A Wryneck (*Yunx torquilla*) was captured, and on being taken within reach of flies, at once picked them up*. When turning about its neck in the manner peculiar to the species, this bird was compared by some of the officers to a particular species of snake found in Greece, and which, like it, has a dark band on the head and neck.

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[*] When, on the 16th of April, on our passage from Marseilles to Malta, and about twenty miles southward of the most southern point of Italy, two of the *Motacilla neglecta*, both males, flew on board the steam-packet, they were very tame, and remained in the vessel for half an hour

[†] A continental species, and not the bird—*Emberiza Schœniculus*—known in some parts of the British Islands by this name

Two or three of the *Upupa Epops* and a *Columba Turtur* as yesterday flew on board, but did not remain long. "Large and small hawks" were reported to me as seen about the ship, but the Goatsucker and Cuckoo might, from their general appearance and mode of flight, be not improbably looked upon as "small hawks."

April 26.—Wind N. E., 86 miles from Zante, the nearest land. 130 miles from Navarino. A fine male Woodchat (*Lanius rufus*), a White-collared Flycatcher (*Muscicapa albicollis*), and one of Natterer's Warblers (*Sylvia Natterreri*) were caught on board.

A *Sylvia Trochilus* and a Chiff-chaff (*Sylvia rufa*) were found dead in my cabin, they had not been caught or injured in any way on board, and must, I think, have died from fatigue. want of food could hardly have caused their death, as there were plenty of flies in the cabin. A *Sylvia Curruca*, a Sub-alpine Warbler (*Curruca leucopogon*, Gould), a *Saxicola Œnanthe*, a Whinchat (*Saxicola Rubetra*), a Pied Wheatear (*Saxicola leucomela*), and an *Alauda*, of the same species as noticed yesterday, flew on board, as did two or three individuals of *Motacilla neglecta*. Several of the *Hirundo rustica* about the vessel during the day, and some remained, perching on one of the boats, throughout the night. Three Bee-eaters (*Merops apiaster*) came from the south, and flew close past the ship without alighting. I saw four of the *Columba Turtur* come from the south today, two of them singly, the other two in company one only alighted on the ship, and in the evening was caught when asleep

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* The birds which, in addition to the Wryneck, fed freely on flies, when taken within reach of them immediately after capture, were *Sylvia Trochilus*, *Motacilla neglecta*, *Hirundo rustica*, and *Hirundo urbica*.

April 27 —Wind N , 45 miles from Zante, the nearest land, and in sight 60 miles W of the Morea A Kestrel (*Falco Tinnunculus*) flew close past the ship, and a "much larger hawk," which did not come under my own observation, was stated to have been seen

Two females of the *Oriolus Galbula* which flew on board were captured Two or three males of the *Muscicapa albicollis* visited us today, and as many females either of this species or the Pied Flycatcher (*Muscicapa luctuosa*), but most probably the former

A *Saxicola Rubetra* and a *Motacilla neglecta* came to the ship About a dozen of the *Hirundo rustica*, which rested last night on the rigging, went off this morning Throughout the afternoon and towards evening many more arrived, and continued flying about the ship in considerable numbers

A few of the *Hirundo urbica* appeared this morning and remained through the early part of the day, confining their flight to the lee-side of the ship in the afternoon still more were seen hawking about in company with *Hir rustica*, as flies were numerous, they probably obtained plenty of food at four o'clock P M all of this species were gone

In the morning a *Merops apiaster*, coming from the south-west, alighted for a moment on the vessel and then flew towards Zante or in a north-east direction soon afterwards a flock consisting of fifteen came from the same quarter, hawked about the leeward side of the vessel for a short time, and then proceeded north-east an hour after their departure (ten o'clock) a flock of eight appeared, and alighting on a rope astern the ship, remained there for nearly an hour, they were perched close together, and so low down on the rope, that by its motion the lowest one was more than once ducked in the water, but nevertheless did not let go its hold or change its position for a drier one These birds were but a few yards from the cabin-windows, and looked so extremely beautiful, that they were compared by some of the spectators to paroquets, and on account of their gaudy plumage not very inaptly After these left us, others were seen throughout the day, but generally singly , they rarely alighted all flew in the same course*

A few Goatsuckers (*Caprimulgus Europæus*) appeared about the ship today and alighted, they were all single with one exception, when two were seen in company A few individuals of this species were likewise seen within the last two or three days A couple were shot this afternoon Throughout today the *Columba Turtur* was observed coming from the south, and generally singly very few alighted

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* When not very far to the westward of Cape Matapan on the 1st of May, a flock of twenty-nine of the *Merops apiaster* flew close past the ship towards the Morea

All the birds seen on migration bore right on in the course they had come, whether they rested temporarily on the vessel or otherwise They all came from a southerly direction, either due south, S W or S E The wind was moderate, the weather fine and dry during the whole passage, so that all the species we saw were in the ordinary course of migration, and none driven to the ship by any stress of weather

Although not coming within the title of this communication, inasmuch as it had already taken up its summer quarters, I shall here mention the Alpine Swift (*Cypselus melba*), which upon our entering the fine bay of Navarino on the morning of the 28th, appeared in great numbers careering high overhead Of the *Hirundines* generally, it may be remarked, that from our arrival in France on the evening of the 1st of April, we did not see any of the species until the 9th, when going down the Rhone from Lyons to Avignon About half-way between these places several of the *Cyp melba* were seen flying over the river, and likewise at all suitable places from where they first appeared until we reached Avignon *Hirundo rustica* and *H urbica* were likewise seen several times between Lyons and Avignon, but were nowhere numerous The first I saw of these species (but which of them could not be determined from the distance) was a small flock flying northwards, evidently on migration All indeed which were seen today were I think only temporarily here, and would, after having got sufficient rest and food, move northwards A very few Sand Martens (*Hirundo riparia*) were also seen about the Rhone today At Malta, on the 17th of April, we first met with the Common Swift (*Cypselus murarius*), where, together with the three species of *Hirundo* just mentioned, numbers were flying low and in company, wherever we walked about the island, the day was very fine and warm all four species were about as numerous as in their most favoured haunts in the British Islands

On the 18th of April, when walking in the neighbourhood of Valetta (Malta), six Little Plovers (*Charadrius minor*) in a flock alighted very near us apparently to rest, and after a short time proceeded in their course, which was in a northwest direction

XVIII.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin*

[Continued from p. 35.]

Anatomy of Vegetables.

M. Decaisne† has published a short notice on the structure of the wood of the Misseltoe. He could not confirm the statement of M. Dutrochet, who says that the woody body is wanting in the articulation (Gliederung) between the internodes, and is only connected by a cellular layer of pith, so that, properly speaking, the internodes are connected together solely by the bark. According to M. Decaisne's observations, it is exactly in the internodes that the vessels of the bark are separated, and he says, that on this fact the articulation of this plant depends, but not on the separation of the fibres of the wood. The wood of *Viscum* exhibits no vessels (hereby is meant simple spiral tubes.—*Mey.*), and only in the pith were seen annular tubes; the nerves of the leaves did not possess any spirals. The number of the vascular bundles (Holzbundel) in young twigs is regularly eight, seldom seven or nine, and each is surrounded, both inwardly and outwardly, with a bundle of bast cells.

M. Dutrochet‡ attempted to demonstrate to the Academy that his former statements were correct.

Already in 1838 M. Morren§ had made some physiological observations on a new plant named by him *Malaxis Parthoni*, which, however, I have only lately seen. M. Morren indicates, that a colouring matter similar to indigo must be contained in the leaves of this plant, as in the flowers of *Calanthe veratrifolia* and in the leaves of *Mercurialis perennis*, &c. The presence of indigo in the *Orchideæ* was however discovered years ago by M. Marquart in Bonn. The air-rootlets which were examined by M. Morren were covered with a quantity of very fine hairs, consisting of single transparent cells, the walls of which were very thin, and exhibited within a rotation (cyclosis). [The universal appearance of these rotating streams in the root-hairs of Phanerogams I have already proved.—*Mey.*]

M. Morren observed, that in some of these hairs the globules collected together in masses and formed a kind of partition, by which the cyclosis was prevented; indeed he believes that this is as it were the commencement of the formation of partitions, which are observed to appear in *Confervæ*, &c for the increase of the cells I cannot agree to this hypothesis, for these partitions are formed in quite a different manner, and the appearance of a partition by which the cyclosis within a utricle is divided into two parts is quite an accidental and rare phænomenon I myself observed it in the *Charæ* in 1825 (Linnæa, 1827, p 66), and saw that thereby two streams were produced, which lasted until the obstruction was carried away M Morren observed spiral fibrous cells of various forms in the enlargements of the base of the stalk of this new *Malaxis*

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* Translated and communicated by Henry Croft, Esq.

† De la Structure ligneuse du Gui. Comptes Rendus 1839, p. 204.

‡ Comptes Rendus, p. 215.

§ Notice sur une nouvelle espece de Malaxis, &c. Bull. de l'Acad. de Sci. de Bruxelles, tom. v. No. 8.

M Morren* has published an interesting paper 'On the Discoid Pith of Plants,' which had been observed by Grew in *Juglans regia*, by M Mirbel in *Nyssa aquatica* and *Phytolacca decandra*, as well as by DeCandolle in *Jasminum officinale* M Morren thinks it very probable that this structure of the pith may occur in many other plants, he himself found it in plants belonging to the families *Santalaceæ*, *Juglandeæ*, *Phytolacceæ*, *Jasmineæ*, and *Bignoniaceæ*, but he remarks, that some species of a genus exhibit this formation, while others do not The figures which accompany this treatise of M Morren were drawn from *Begonia argyrostigma*, *Juglans regia*, *Jasminum fruticans*, and *Phytolacca decandra*, the pith in these, as in many other plants, exhibits in the earlier periods of growth a homogeneous mass of cells, in which, finally, more or fewer horizontal clefts (slits) make their appearance These slits are placed in regular order above one another, they increase gradually, and are finally separated merely by membranous dissepiments M DeCandolle believed that these cavities arose from a rupturing of the cellular tissue caused by the extension produced by the growth of the plant, but M Morren has shown that they arise from a regular separation of the cells, and are therefore to be compared to the air-passages

Mr Patrick Keith† has made some observations on pith, in order to settle the two following questions —1st, Does the pith appear in any part of the root? and 2ndly, Are the dimensions of pith changed after it is once fully developed? With respect to the first question, observations made on the roots of young plants of *Acer pseudoplatanus*, *Fagus sylvatica*, and *Corylus Avellana*, showed him that the principal root is also furnished with pith The second question Mr Keith answers by the examination of a three-year-old ash stem which was almost 9 feet high The last sprout, or shoot, was $\frac{5}{8}$ths of an inch in diameter, and had a pith of $\frac{1}{4}$th of an inch in diameter in the thickest part, the middle shoot was $\frac{7}{12}$ths of an inch thick, and had a pith of $\frac{1}{6}$th of an inch in diameter, the oldest and lowest twig had $\frac{7}{8}$ths of an inch in diameter, and the pith was $\frac{1}{10}$th of an inch thick In the same twig the pith was not found to be of uniform thickness, but became thinner from the upper towards the lower extremity

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* On the Discoid Pith of Plants, Ann of Nat Hist, Oct 1839, p 73–88

† Of the Pith of Plants, Ann of Nat Hist, Ap 1839, p 77

Of the beautiful anatomico-botanical plates which have been published by M Link[*], we have now received a third number, in which a great many of the most various and well-chosen objects are represented In this number we see the great advances which the artist, M C F Schmidt, has made as to execution, some of the plates, particularly tab viii, may be said to belong to the most successful of their kind Most of the figures show the structure of the roots of plants, and exhibit the difference therein between root and stem On tab viii is found the anatomy of prickles and thorns, of which we had as yet scarcely any delineations

M Korthals[†] has communicated some remarks on the glanduliferous hairs of *Drosera*, with which my own observations do not agree These hairs are said to consist of fibres or extended cells, which are covered by a scarcely developed epidermis, and support on the end a small red globule, which in old age falls off, but is also covered by the epidermis The fibres of the hair extend into the cavity of the apex, but before their entry are somewhat widened In the interior of this cavity the fibres form a small, egg-shaped, projecting body, and round this columella are found a quantity of small, red, angular particles, &c

As in my paper on the organs of secretion of vegetables I have given a description and figures of the glanduliferous hairs of *Drosera* which are totally different from the above, it is necessary to enter very fully into the subject, but before I attempt to interpret the statements of M Korthals, I must state, that I do not know what he understands by "epidermis" this is unfortunately the result of the change and supposed improvement of old, well-known names In the above memoir I have shown that the hairs of *Drosera* have a very complicated structure, the hair itself exhibits in its interior a spiral tube which penetrates deep into the apex of the gland, but there is no trace of a cavity in this so-called gland-head The hairs which form the stalk of the gland are not here, as in most cases, simple excrescences of the upper walls of the epidermal cells, but true excrescences of the substance of the leaf, and appear very early, and therefore one may correctly say, that the whole hair and the head is covered by the epidermis In quite young organs of this kind it may be seen very distinctly that the gland-head is nothing more than the apex of the compound hair which at a later period thickens, and then stalk and head are still covered by a uniform epidermis Afterwards the stalk (that is, the hair) extends to a great length, and thereby all the cells obtain a lengthened form, and the outer layer does not differ from those beneath it

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[*] Ausgewahlte anatomisch-botanische Abbildungen Berlin, 1839

[†] Remarques sur les poils du Drosera Bull des Sci &c en Neerlande, p 49, Rotterdam, 1839

But with the gland-head it is quite different, the epidermis still retains its small cells, is generally filled with red-coloured sap, and exhibits the red angular bodies which M Korthals mentions With good microscopes one may see directly under this small-celled epidermis ten or twelve large, elongated, columnar cells, which form the axis of the gland-head, in their completely developed state they often exhibit in their interior very plain spiral fibres, and let the spiral tubes of the stalk run between them Even in transverse sections there is nothing to be seen of a cavity in the gland-head, and that none such is present may be better seen in those glands which are found on the edges of the leaves of *Drosera rotundifolia* These gland-hairs are (I do not know whether they are similarly formed in other species of *Drosera*) much larger than the others, the stalk is widened at the extremity like a spoon, and on the side of this spoon sits the glandular organ which effects the secretion

It is peculiar to the glanduliferous hairs of *Drosera* (and herein they agree with the similar organs in *Nepenthes*), that here and there on the stalks are found small simple glands which consist of two adjoining vesicular cells, they are filled with green-coloured sap-globules, while the other cells of the stalk generally contain a red sap It is as if these little glands took the place of the two semilunar cells of the cuticular glands, sometimes one sees real single cuticular glands with stomata, in *Nepenthes*, it is true, the structure of these accessory organs is different

I* had the opportunity of procuring a couple of stems of *Musa paradisiaca*, the flower-stalks of which are (as I have already noticed, when at the Sandwich Islands) so very rich in unrollable spiral fibres The fibres were extracted from the flower-stalks of the above stems with all possible care, and this was best effected by breaking the stalk into short pieces, drawing the ends about an inch or an inch and a half asunder, and then taking away the extracted fibres with a pair of wooden pincers, and throwing them directly into water, in order to free them in the first place from the adhering mucus, and secondly, from the tannic acid, from the presence of which they acquire a brown tinge when exposed to the air The wool obtained in the above manner is equal to the finest sheep's wool, and surpasses it in whiteness, as also in the finer and more regular curling of the single filaments The quantity obtained from the two stems was so considerable, that an artisan wished to make a glove out of it, and therefore it could not be difficult to obtain such large quantities of this material in the tropics (where every year thousands of pisang stems are cut down in some localities) as to be able to prepare valuable stuffs, indeed, shawls made of the fibres of the pisang could not be so expensive as the Persian ones

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* Verhandlungen des Vereins zur Beforderung des Gartenbaues in den Preuss Staaten xiv 2tes Heft Berlin, 1839, p 187

MM P Savi and G B Amici* have made some communications concerning the stomata of plants The observations of M de Cesati on the stomata of *Ambrosinia Bassii*, which have not been confirmed by MM Savi and Amici, were the cause of the research M de Cesati thought that he had observed a very peculiar structure in the cuticular glands and stomata of *Ambrosinia Bassii*, he speaks of a glandulous matter of which the outer edge of the stoma consists, which thereby presses apart the sides of the four inclosing cells The real cleft is destined for the evaporation alone, whilst one of the two glandulous pads or circles is destined for the separation of carbon, the other for that of oxygen, &c M Savi examined *Ambrosinia* as far as regards its stomata, and found them similar in structure to those of other plants, as is shown by the figures, the stomata are usually formed by two semilunar cells, but they are covered by a second *cuticula*, which also exhibits a longitudinal cleft, even in the figure of a transverse section through the middle of such a stoma, this cuticle is represented with its slit M Amici also, in his answer to M Savi, has confirmed the above statement with respect to the structure of the stomata of *Ambrosinia* Finally, M Amici proves that the priority of the discovery of the stomata in the bottom of the deep pits on the lower surface of the leaves of *Nerium* belongs to him, inasmuch as he communicated this

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[*] Osservazioni sulla struttura ed esistenza degli stomi in alcune piante, &c Mem della R Acad delle Sc di Torino, Serie ii tom ii p 49

discovery in a letter to M Mirbel in August 1830, and this letter has been used by M Brongniart, although the observation is rejected [The presence of stomata in the hairy pits of the *Nerium* leaves was first published by M Krocker, jun of Breslau, in his dissertation 'De Epidermide Plantarum,' 1833 —*Mey*]

M Morren* has examined anatomically several species of *Hedychium*, and has recorded his observations and accompanied them with figures We receive information concerning the cells and their contents both in young and old leaves, as also on the occurrence of crystals in these different ages of the species of *Hedychium*, also several forms of crystals are mentioned as having been observed in these plants

On the walls of the air-cells M Morren found peculiar cells which were provided with green-coloured sap-globules, were of various forms, but very often corniform and hamate, sometimes symmetrical, sometimes unsymmetrical, they are said to be similar to the stelliform hairs of the *Nymphææ*, in which however I cannot agree, for these cells are nothing else than more or less regularly formed stellar-shaped cells, as they generally occur in the *Scitamineæ* M Morren also thinks that he has found that evaporation does not assist the formation of crystals in plants, inasmuch as it is exactly in the dry and peripheric parts of plants that crystals are not found The other communications only confirm that which had been heretofore observed in *Hedychium*, or in other similar plants

From M Morren† we have received a similar work on the genus *Musa* in it the formation of the stellar-formed cellular tissue is fully described, and some remarks are made on the acicular crystals found in the *Musa* and other plants The observations on the formation of the above-mentioned tissue confirm my former statements, viz that those cells are produced from ordinary parenchym-cells M Morren saw the molecular motion in several cells of *Musa*, and after he had observed single parts of the plant in different stages of development, he arrived at the conclusion, that substances in the interior of the stellar-shaped cells make their appearance in the following order —first appear self-moving gum or fecula-globules, then motionless chlorophyll (*i e* globules coloured by chlorophyll, *Mey*), and then free globules and crystals all these matters are formed successively When considering the crystals which are found so frequently in the parenchymatic cells of *Musa*, M Morren observes, that the crystal-bearing cells, which M Turpin has called Bifornes, decidedly require a peculiar name, and that in the case of *Caladium rugosum*, where they exhibit only one opening, they must be called Unifornes, and that from the same reason it is necessary to call the other cells, without openings, which contain acicular crystals, by a determinate name, and he proposes for them Clestines (from *κλειος*)

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* Bull de l'Acad Royale de Bruxelles, t vi no 2

† Observations sur l'Anatomie de *Musa* —Bullet de l'Acad Roy de Bruxelles, t vi no 3

I have shown in the former reports that there is no sufficient existing reason for giving these cells a distinct name as M Turpin had done, but I can still less approve of these new appellations Uniforme and Clestine, because, if one examines the *Caladia* in regard to these cells, it is soon evident, that in different parts one and the same kind of cells is found in one place as Clestines, in another as Unifornes, and in others as Bifornes, and the latter appear always as simple cells when in a young state the different names would only lead us to suppose that there was here some actual difference The opening of the so-called Bifornes is evidently a purely physical phænomenon, as was proved in the former Report (p 110) M Morren remarks, that in the Clestines of *Musa* he had observed a gummous mass, an appearance which I myself have observed in other plants The treatise is accompanied by good figures

M S F Hoffmann* has continued his observations on the hairs in the air-passages, he found them in all the species of *Limnanthemum* he examined, but without dots, and he convinced himself that they do not exist in *Villarsia* Among the *Nymphææ*, the genus *Euryale* (*ferox*) exhibited such dotted hairs as are found in the air-cavities of the different organs of the genera *Nymphæa* and *Nuphar*

M Hoffmann treats of the same subject in the last part of the Tijdschrift of v d Hoeven and de Vriese for 1839, p 269–271 In the same volume, p 257–269, M Hoffmann gives the results of his new researches as to *Lemna arrhiza* being a distinct species, as also anatomico-physiological observations on the formation of buds in the different species of *Lemna*. these communications are, however, only to be considered as the forerunners of a larger work which M Hoffmann had sent to the press, and has just appeared in the first number for 1840 of Wiegmann's 'Archiv fur Naturgeschichte,' we shall therefore review it in our next Report

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* Nachtrag zu des Beobachtung der Luftrohrenhaare bei *Limnanthemum*, Gmelin, and *Villarsia*, V —Linnæa, xiii pp 294, 296

M Hoffmann* examined fresh peduncles of *Nelumbium luteum* and *speciosum*, the air-passages of which have diaphragms composed of a stellar-formed cellular tissue, but do not contain any such hairs as in the *Nymphææ* M Hoffmann found however that the sides of the air-cavities of these plants were covered with groups of crystals, which during their increase tear asunder the membranes of the inclosing cells, and in this manner project into the cavities, as in *Pontederia cordata* and *Myriophyllum*, &c

[To be continued]

BIBLIOGRAPHICAL NOTICES

Naturalist's Library —the Natural History of Dogs, vol ii , *and the Natural History of Horses*

THESE two volumes are from the pen of Lieut -Col Chas Hamilton Smith, so well known for his valuable contributions to the volumes on Mammalia of Griffiths s edition of the ' Règne Animal

The author includes in the family *Canidæ* or Dog tribe the three genera *Canis, Hyæna,* and *Proteles* The first of these genera he divides into numerous sections the characters of which, in many instances, are far from being satisfactory

In a former volume Col Smith treats of the *Canidæ* which are *diurnal and have round pupils to the eyes,* constituting his subgenus *Chaon,* which includes the Wolves and Jackals , these the author subdivides into no less than ten sections

The present volume contains an account of the Domestic Dogs the Foxes, the Hyænas, and the curious genus *Proteles*

The Domestic Dogs Col Smith does not consider have descended solely from a species of Wolves or Jackals " but from genuine Wild Dogs of more than one homogeneous species ' The grounds upon which this opinion is founded are discussed in the first volume

Although we suspect naturalists will not adopt Col Smith's numerous new subdivisions of the *Canidæ,* still we feel sure his volumes on the Dogs as well as the volume on Horses will be regarded by them as most valuable contributions to their branch of science—the great research displayed by the author in the treatment of his subject has rendered them such

Col Smith combats the opinion expressed by some authors that the aboriginal region where the Wild Horse was first subdued was Africa , and enters into a long argument to prove the original habitation of the Domestic Horse, considered as a single species, "should be sought in High Asia, about the fortieth degree of latitude the table-land whence riding and charioteer nomads have incessantly issued, penetrating to the east, the south, and the west, from periods evidently anterior to historical record almost to our own times , that from Central Asia, northward and westward, and including, to the south, Bactria, the valley of the Oxus, Northern Asia, Chorasmia, and probably the whole of Europe constitute the great primitive habitation of the Horse Far to the north the species has no congener but soon the *Hemionus* is known to be its companion, and further to the south, the Wild Ass extends eastward across the Indus to the Bramaputra, and west into Africa, far up the banks of the Bahar-el-Abiad and Atbara Other congeners there are on this side the equator but they are not sufficiently known, nor is their precise location determined "

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* Tijdschrift, &c , 1839, p 271—274

The author however inclines to the belief that the nations who first subdued horses derived each their own race from the wild stock in their vicinity, observing in the descriptions by the poets and historians of antiquity the uniformity of colours and characters recorded of the primitive breeds such as the pied variety in the central mountains of Middle Asia the dark bay southwards of the banks of the Jyhoun or Jaxartes the dun more westward, as far as the Caspian, the white on the north shore of the Euxine, and the sooty and black in Europe We shall find, observes Col Smith 'among these, races always clouded of two colours others constantly marked with a black streak along the spine, often cross barred on the joints with dark or black extremities, and again, another, where circular spots, commonly clearer than the ground-colour, occur—whether they be bay, blackish ashy or gray, the durability of these distinctions not obliterated even in our time, during more than 3000 years of perpetual crossings of breeds, affords another and a strong argument in favour of an aboriginal difference of species in the single form of the Domestic Horse

The Natural History of Fishes,' vol ii, by J T Bushnan, M D &c, forms an introduction to the other volumes, belonging to the series, on this group of animals, treating of Fishes in relation to other animals, their natural habitat, structure, locomotion, &c —the œconomical and commercial uses and advantages arising from our fisheries are also dwelt upon The plates are selected for illustration of these various subjects, and therefore do not follow in any order of classification, as in the volume on Perches already published Such a volume as the present one was much wanted, and has been ably executed by Dr Bushnan

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PROCEEDINGS OF LEARNED SOCIETIES

ZOOLOGICAL SOCIETY

December 8, 1840 —W H Lloyd, Esq, in the Chair

Mr Gould completed the exhibition of his fifty new species of Australian birds, and characterized the following new species —

A new *Entomyza* interesting as being the second species of that form Mr Gould received this bird from Port Essington, and believes that it there supplies the place of *E cyanotis*, which is common on the eastern coast Its distinguishing characteristics are its rather larger size, the markings of its throat being more strongly defined and the basal half of the primaries being white, for which reason he proposes to characterize it as

ENTOMYZA ALBIPENNIS *Ent corpore supra et alis e viridi aureo-olivaceis, primariis fuscis, pogoniis internis per dimidium basale niveis*

Crown of the head and back of the neck black, lower part of the face, chin and centre of the chest slaty black, a crescent-shaped mark at the occiput, a line from the lower mandible passing down each side of the neck and all the under surface pure white, upper surface and wings greenish golden olive, primaries brown the basal half of their inner webs snow white tail feathers brown tinged with golden olive, all but the two centre ones tipped with white, bill bare space surrounding the eye and feet in all probability the same as in *E cyanotis*

Total length, 12 inches bill, $1\frac{1}{2}$ wing 6, tail $4\frac{3}{4}$ tarsi, $1\frac{3}{8}$

Hab Port Essington on the northern coast of Australia

Nearly allied to *E cyanotis* but always distinguishable from that species by the white basal half of the primaries

A new *Myzomela* differing from all the other members of the genus in its pied colouring and the black band across the chest which suggests the specific name of

MYZOMELA PECTORALIS *Myz gutture et corpore subtus albis, pectore fasciâ angustâ nigrâ transversim notato*

Forehead, crown of the head, the upper surface wings, tail and a narrow band across the chest black throat upper tail-coverts and all the under surface white bill and feet black

Total length $4\frac{1}{2}$ inches bill $\frac{5}{8}$, wing $2\frac{7}{8}$, tail $1\frac{3}{4}$ tarsi $\frac{5}{8}$

Hab North west coast of Australia

A second example of the genus *Dasyornis*, inhabiting Swan River, which I propose to call

DASYORNIS LONGIROSTRIS *Das colore ut in D Australi, differt autem staturâ corporis minore, rostro grandiore*

All the upper surface brown, wings, tail coverts and tail rufous brown, the latter indistinctly barred with a darker tint, under surface gray gradually passing into the brown of the upper surface irides bright reddish brown, bill and feet dark horn-colour

Total length $7\frac{1}{2}$ inches, bill, $\frac{7}{8}$, wing $2\frac{3}{8}$, tail, 4, tarsi, $\frac{7}{8}$

Hab Western Australia

This is a somewhat smaller bird but has a longer bill than *D Australis*

An entirely new form belonging to the family *Saxicolinæ*, and nearly allied to *Petroica*, I propose to make the type of a new genus, *Drymodes*, signifying a lover of woodland places —

Genus DRYMODES

Characteres generici —*Rostrum* rectum, ad latera apicem versus paulò compressum fere longitudine capitis apice levitèr denticulato, basi vibrissis parcè instructa *Alæ* mediocres, rotundatæ, remigum primo brevissimo quinto longissimo *Cauda* mediocritèr elongata, paulo rotundata *Tarsi* longi, graciles, anticè superficie integrâ. *Digiti* mediocres, externus horum quàm internus paulò longior, posticus cum ungue quam digitus intermedius cum ungue brevior

DRYMODES BRUNNEOPYGIA *Dry fusca, primariis apud pogonia interna albo transversim striatis, uropygio tectricibusque caudæ rufo-fuscis*

Head and all the upper surface brown passing into rufous brown on the upper tail coverts, wings dark brown, the coverts and primaries edged with dull white primaries and secondaries crossed near the base on their inner webs with pure white, tail rich brown all but the two middle feathers tipped with white under surface grayish brown passing into buff on the under tail-coverts, irides bill and feet blackish brown

Total length, 8 inches, bill, $\frac{7}{8}$, wing, $3\frac{7}{8}$ tail, $4\frac{1}{4}$, tarsi, $1\frac{1}{2}$

Hab Belts of the Murray in South Australia

This bird although of a large size and so sombre in colouring is nearly allied to *Petroica*

The next is an extraordinary form among the *Muscicapidæ*, differing from all the other known members of that group in having the bill compressed laterally for which reason I propose to constitute it the type of a new genus with the following name and characters

Genus PIEZORHYNCHUS

Characteres generici —*Rostrum* quàm caput longius, altius plusquàm latum, ferè cylindraceum, lateralitèr compressum, apicem versus denticulatum *Nares* parvæ, rotundatæ, basales *Alæ* breves, remige primo mediocri, quarto longissimo *Cauda* aliquanto brevis et rotundata *Tarsi* mediocriter elongati et paulò debiles *Digitus* externus et medius inter se connexi usque ad articulum primum, externus longissimus

The only specimen I possess was forwarded to me by E Dring Esq, surgeon of H M S Beagle, by whom it was procured on the north-west coast of Australia From the glossy nature of its plumage I propose to name it

PIEZORHYNCHUS NITIDUS *Piez fulgide virescenti-niger*

All the plumage, including the wings and tail, rich deep glossy greenish-black, bill and feet black

Total length, $7\frac{1}{4}$ inches, bill, $1\frac{1}{8}$, wing, $3\frac{1}{4}$, tail, $3\frac{1}{4}$, tarsi, $\frac{3}{4}$

Hab North-west coast of Australia

This very curious bird belongs, I conceive, to the *Muscicapidæ*, and is somewhat allied to *Seisura*

A new *Praticola*, common on the plains round Adelaide, and forming the second example of the genus, is

PRATICOLA CAMPESTRIS *Prat fronte et plumis auricularibus rufis, gutture albescente, corpore subtùs et lateribus ex arenaceo luteolis fusco striatis*

Forehead rufous, passing into the reddish brown of the crown and upper surface, with a stripe of blackish brown down the centre of each feather, wings sandy brown, internal webs of the primaries dark brown, two centre tail-feathers reddish brown, the remainder reddish brown at the base, crossed towards the extremity with a broad band of brownish black and broadly tipped with white, over the eye a line of white, ear-coverts mingled rufous and white, throat white, gradually passing into the buff of the under surface, all the feathers of the under surface with a stripe of brownish black down their centre bill blackish, lighter at the base of the under mandible, irides rufous brown, feet blackish brown

Total length, 4½ inches, bill, ⅝, wing, 2¼, tail, 2, tarsi, ⅞

Hab South Australia

Closely allied to but much smaller than *Calamanthus striatus*

A new *Acanthiza* as

ACANTHIZA INORNATA *Acanth corpore suprà, alis caudâque olivaceo-fuscis, hâc nigrescenti-fusco late fasciatâ, corpore subtus pallidè luteolo*

All the upper surface, wings and tail olive brown, primaries dark brown tail crossed by a broad band of brownish black all the under surface light buff, irides greenish white, bill and feet black

Total length, 3½ inches bill, ½, wing, 1⅞, tail, 1½, tarsi, 11/16

Hab Western Australia, particularly the neighbourhood of Swan River

A new species from Swan River, which, with the *Muscicapa macroptera* of Messrs Vigors and Horsfield, I propose to erect into a new genus under the name of *Micrœca*

Genus MICRŒCA

Characteres generici —*Rostrum* quam caput brevius, depressum, ad basin latum gonyide recto, apice incurvo et leviter denticulato *Nares* rotundatæ ad basin rostri vibrissis validis instructam positæ *Alæ* longæ et fortes remigum primo brevi, tertio longissimo *Cauda* aliquantò brevis et ferè quadrata *Tarsi* mediocres debiles *Digiti* debiles, externus quàm internus valde longior

As the species now exhibited closely assimilates to the *M macroptera*, I propose to designate it as

MICRŒCA ASSIMILIS *Mic superne, caudæ rectricum externorum pogoniis internis per partes tres longitudinis a basi fuscis*

All the upper surface brown, primaries dark brown, tail brownish black, the tips and the terminal half of the external margins of the two outer feathers white the three next on each side are also tipped with white, the extent of the white becoming less upon each feather as they approach the centre of the tail, the four middle feathers without the white tip, throat, centre of the abdomen and under tail-coverts white, passing into pale brown on the sides of the chest and flanks, irides reddish brown, bill and feet blackish brown

Total length, 4⅝ inches, bill, 9/16, wing 3⅜, tail, 2⅛, tarsi, 9/16

Hab Western Australia

Nearly allied to but much less in size than *Muscicapa macroptera*, Vig and Horsf, and from which it may also be distinguished by the base of the outer tail-feather being brown

MYIAGRA LATIROSTRIS *Myi corpore supra, alis caudaque intense cæruleo-cinereis, capite et nuchâ fulgidè virescentibus, gutture et pectore arenaceo-luteolis, abdomine albo*

All the upper surface wings and tail dark blueish gray with a shining greenish lustre on the head and back of the neck, throat and chest sandy buff, under surface white, bill much dilated laterally and black, irides blackish brown feet black

Total length, 6 inches bill, $\frac{3}{4}$ wing, $2\frac{3}{4}$ tail, $2\frac{3}{4}$, tarsi, $\frac{5}{8}$

Hab North west coast of Australia

From the collection of Mr Dring

HIRUNDO LEUCOSTERNUS *Hir dorso medio gutture et pectore albis, abdomine, uropygio alis caudaque nigris et chalybeio-cæruleo-nitentibus*

Crown of the head brown bounded with white back of the neck brown centre of the back chin throat and chest white, the remainder of the plumage black slightly glossed with steel-blue bill black, feet brown

Total length, $7\frac{1}{4}$ inches, bill, $\frac{5}{16}$, wing, $3\frac{3}{4}$ tail, which is deeply forked $2\frac{3}{4}$, tarsi, $\frac{7}{16}$

Hab Interior of Australia

The only specimen of this bird that has ever come under my notice, was given me by Mr Charles Coxen, who informed me it was shot by one of his men while flying in company with another over a small pool on the banks of the Namoi

A small bird inhabiting the scrubs of the River Murray It is a new form, nearly allied to *Acanthiza* The generic term is suggested by the ruddy colouring of the throat

Genus PYRRHOLÆMUS

Characteres generici —*Rostrum* quàm caput brevius, ad latera paulò compressum, ad apicem denticulo vix notando, vibrissis parvulis ad basin naribus linearibus et operculo tectis *Alæ* breves rotundatæ, remigum primo perbrevi, tertio longissimo *Cauda* brevis rotundata, concava *Tarsi* mediocres, digitus externus quàm internus longior

PYRRHOLÆMUS BRUNNEUS *Pyrrh superne brunneus, gutture rufo*

Lores greyish white all the upper surface and wings brown, tail brownish black, the three lateral feathers on each side largely tipped with white, centre of the throat rufous, the remainder of the under surface brownish grey, passing into sandy buff on the flanks and under tail-coverts, bill and feet blackish brown

Total length, $4\frac{1}{2}$ inches, bill, $\frac{1}{2}$, wing $2\frac{1}{4}$, tail, $\frac{7}{8}$, tarsi, $\frac{13}{16}$

Hab Belts of the Murray in South Australia

The female differs in having no red on the throat

A highly interesting Pigeon from the north-west coast, which, as it differs from all the other forms of its family, and is said to inhabit the rocks, I propose to make the type of a new genus, with the name of

Genus PETROPHASSA

Characteres generici —Ferè ut in Peristera *Alæ* autèm et rotundatæ sunt et admodùm breviores, deest etiam color metallicè æneus *Cauda* magis rotundata

PETROPHASSA ALBIPENNIS *Petr superne fusca, gutture albo-guttato, primariis ad dimidium basale albis*

Crown of the head and neck grayish brown margined with sandy brown all the upper surface chest and tail rufous brown, the centre of each feather inclining to gray lores black, abdomen and under tail-coverts chocolate brown throat clothed with small feathers white at the tip black at the base, primaries dark brown at their tips, the basal half pure white bill and irides blackish brown feet reddish brown

Total length $10\frac{1}{2}$ inches bill $\frac{7}{8}$, wing $5\frac{1}{4}$, tail, 5 tarsi, $\frac{3}{4}$

Hab Western Australia

Allied to the members of the genus *Peristera*

EUDROMIUS AUSTRALIS *Eudr colore cervino vel luteolo abdomine medio castaneo parte inferiore nec non crisso albis*

Forehead and all the upper surface light sandy buff the centres of the feathers being brown primaries brownish black with sandy buff shafts and all but the first four broadly margined with the same, throat buffy white below which a crescent-shaped mark of blackish brown, chest flanks and under surface of the wing buff, passing into reddish chestnut on the abdomen beyond which the vent and under tail-coverts are white tail brownish black the centre feather margined with buff the outer ones with white, bill dark olive brown feet yellowish brown

Total length, $7\frac{1}{2}$ inches, bill, $\frac{7}{8}$, wing, $5\frac{1}{4}$, tail $2\frac{1}{2}$, tarsi, $1\frac{3}{8}$

Hab Interior of South Australia

This is a highly interesting species since it is the only bird approaching the form of the British Dottrel found in any part of the world This rare species has been sent me by my friend Captain Sturt, who procured it during his late expedition into the interior of Australia behind Adelaide

RHIPIDURA ISURA *Rhip corpore suprà sordidè fusco, caudæ rectricum utrinque externâ albo extrinsecus marginatâ et latè terminatâ proximâ albo ad apicem notatâ, iterumque proximâ apicem versus lineâ albâ tenuissimâ*

All the upper surface dull brown wings and tail darker brown, the outer feather of the latter on each side margined externally and largely tipped with white, the next having a large irregular spot of white at the tip, and the next with a minute line of white near the tip chin and under surface buffy-white, with an indication of a dark brown band across the chest, bill and feet black

Total length, 8 inches, bill $\frac{5}{8}$, wing, $3\frac{3}{8}$, tail, $3\frac{1}{2}$, tarsi, $\frac{11}{16}$

Hab North-west coast of Australia

In the collection of his Excellency Captain Grey and Mr Dring

Rather a large species, and is distinguished from the other members of the genus by the sombre hue of its plumage and the square form of its tail

Psilopus culicivorus *Psi abdomine crissoque albis, rectricibus caudæ, duabus intermediis exceptis, albo ad basin latè fasciatis*

All the upper surface olive-brown, wings brown margined with olive, two centre tail-feathers brown, the remainder white, crossed by an irregular band of black and tipped with brown, the band upon all but the external feathers, so blending with the brown at the tip that the white between merely forms a spot on the inner web, lores blackish-brown, line over the eye, throat and chest light gray, passing into buff on the flanks, and into white on the centre of the abdomen and under tail-coverts, irides light reddish yellow, bill and feet black

Total length, $4\frac{1}{4}$ inches, bill, $\frac{1}{2}$, wing, $2\frac{1}{4}$, tail $1\frac{3}{4}$, tarsi, $\frac{5}{8}$
Hab Western Australia

A new species and new form, which I first saw in the streets of Adelaide, where it was hopping about and presenting the appearance of the Sparrow in London For this new bird I propose the generic and specific terms *Xerophila leucopsis*.

Genus Xerophila

Characteres generici —*Rostrum* breve, semiconi instar, ad basin robustum, ad apicem haud denticulatum basi vibrissis anticè ductis parce instructa, naribus rotundatis et plumis minutis obtectis *Alæ* mediocres, remigum primo brevi, tertio et quarto longissimis, tertiariis latis et paulò elongatis *Cauda* mediocris, ad apicem quadrata, et aliquantò concava *Tarsi* robusti, digitus posticus validus, digiti antici debiles horum externus longissimus

Xerophila leucopsis *Xer facie albâ, corpore supernè fusco*

Forehead and lores white, upper surface olive brown, wings and tail brown, the latter passing into black near the extremity and tipped with white, all the under surface pale buff, bill and feet black

Total length, 4 inches, bill, $\frac{3}{8}$, wing, $2\frac{1}{2}$, tail, $1\frac{3}{4}$, tarsi, $\frac{3}{4}$
Hab South Australia

Licmetis pastinator *Lic albus, loris coccineis, remigum pogoniis internis necnon caudæ rectricum sulphureis, colore quàm in L nasico intensiore cui speciei magnitudine corporis L pastinator magnoperè præstat*

Lores [illegible], general plumage white, the base of the feathers of the head and front of the neck scarlet showing through and giving those parts a stained appearance, the basal half of the inner webs of the primaries, the inner webs of all the other feathers of the wing and the inner webs of the tail-feathers beautiful brimstone yellow, naked space round the eye greenish blue, irides light brown, bill white, feet dull olive gray

Total length, $17\frac{1}{2}$ inches, bill, $1\frac{5}{8}$, wing, 12, tail, 7, tarsi, 1
Hab Western Australia

Nearly allied to *Licmetis nasicus*, but of a much larger size

Numenius uropygialis. *Num. vertice fusco, lineâ luteolâ angustâ et inæquali per medium currente; uropygio et tectricibus caudæ fusco alboque fasciatis.*

Crown of the head brown, with a narrow irregular stripe of buffy white down the centre; lores and line behind the eye brown; line over the eye, neck and breast buffy white, with a brown line down the centre of each feather, the brown colour predominating; centre of the back and scapularies dark olive, spotted on their margins with light buff; wing-coverts the same, but lighter and presenting a mottled appearance; primaries blackish brown with white shafts; rump and upper tail-coverts barred with brown and white; tail pale brown barred with dark brown; chin, lower part of the abdomen and under tail-coverts white; bill blackish horn-colour, fleshy at the base; feet grayish black.

Total length 15 inches; bill 3; wing $9\frac{1}{2}$; tail 3; tarsi $2\frac{1}{4}$.

Hab. South coast of Australia.

Nearly allied to N. *Phæopus*, but distinguished from that species by the brown colouring of the rump.

Numenius minutus. *Num. uropygio tectricibusque caudæ intensè fuscis, marginibus plumarum albo guttatis; corpore subtùs luteolo.*

Forehead dark brown mottled with buff; lores and line behind the eye buff; back, sides and front of the neck buff, with a fine line of brown down the centre of each feather; all the upper surface blackish brown, with a series of triangular spots round the margins of the feathers of a sandy buff; shoulders, primaries and secondaries blackish brown, the latter with white shafts; rump and tail-coverts dark brown spotted with white on the margins; tail grayish brown barred with black; chin white; under surface light buff; flanks and under surface of the wing deep buff, regularly barred with arrow-shaped marks of brown; irides black; bill fleshy at the base, olive brown at the tip; feet bluish flesh colour.

Total length 12 inches; bill $1\frac{3}{4}$; wing 7; tail 3; tarsi $1\frac{3}{4}$.

Hab. New South Wales.

This is one of the smallest species of the genus. I never but once saw a flock of this bird, out of which I killed two on the race course at Maitland on the Upper Hunter.

Porphyrio bellus. *Porph. capite, collo et corpore subtus intensè cæruleis, facie gutture et pectore virescenti-cæruleis; dorso alis caudaque e fusco nigris.*

Head, neck and all the under surface deep blue; sides of the face, front of the throat and chest greenish blue; back, wings and tail brownish black; shoulder and edge of the wing and outer margins of the primaries greenish blue; under tail coverts white; irides bright red; bill red; legs grass-green, except the knees, lower part of the tarsi and inside of the feet, which are dark greenish gray.

Total length 18 inches, bill $1\frac{3}{4}$, wing $10\frac{1}{2}$, tail $4\frac{1}{2}$, tarsi $3\frac{1}{2}$.

Hab. Western Australia.

Otis Australasianus. *Ot. vertice et occipite nigris; capitis lateribus, collo et pectore e cinereo albis fusco adspersis, singulis* *plumis crebrè lineis transversis fuscis et tortuosis vel fractis striatis, pectore fasciâ nigrâ haud æquali ornato*

Crown of the head and occiput black sides of the head, the neck and breast grayish white, each feather crossed by numerous fine zigzag bands of brown, giving those parts a freckled appearance, wing-coverts black largely tipped with white, all the upper surface, wings and upper tail coverts brown very minutely freckled with reddish brown some of the feathers towards the hinder parts of the body tinged with gray, tail gray, crossed near the centre by an interrupted band of white, minutely freckled with white, margined with brown and slightly tipped with white, chest crossed by an irregular band of black beyond which the under surface is white, under tail coverts grayish black tipped with white irides brownish buff, brown predominating near the pupil, eyelash pale olive yellow, bill straw white with olive and black culmen, legs and feet straw-yellow

Total length, 40 inches, bill, 4, wing 25 tail, 10, tarsi, 7½

Hab Plains of the interior of Australia generally

ANAS NÆVOSA *Anas intense fusca, plumis albo irroratis et longitudinaliter notatis*

The whole of the plumage dark brown minutely freckled and spotted with irregular oblong marks of white in the direction of the feathers the under surface the same but lighter and tinged with buff, wings without a speculum primaries plain brown irides light brown, bill greenish gray, becoming much darker at the tip, legs bluish green

Total length 17 inches bill 2½, wing, 9, tail, 3, tarsi 2

Hab Western Australia

The above is the description and measurements of a female

SULA AUSTRALIS *Sula primariis alarum et secondariis necnon rectricibus caudæ duabus intermediis fuliginoso-fuscis, tarsis anticè digitisque viridi flavis*

Crown of the head and back of the neck beautiful buff the remainder of the plumage white, with the exception of the primaries, secondaries and four centre tail-feathers, which are fuliginous brown with white shafts, irides olive white, bill brownish horn colour slightly tinged with blue, space round the eye leaden blue, bare skin at the base of the beak and down the centre of the throat nearly black, front of the tarsi and toes sickly greenish yellow, webs brown

Total length, 32 inches, bill, 5½, wing, 19, tail, 10, tarsi, 2

Hab The Tasmanian Seas

The specimen exhibited is from the River Derwent Like the other members of its family, this species will allow of its being taken with the hand Some of my specimens were so taken on a rock on the Actæon Islands

The circumstance of being enabled to bring an entirely new Albatros before the notice of the Society is a source of great gratification to me, since the group to which it belongs had already been paid much attention to by our early voyagers and later naturalists The present bird differs from all the other species in the extreme caution with which it avoids rather than approaches the neighbourhood of vessels at sea It is rather abundant in Bass s Straits and in all the seas off Van Diemen's Land

From its shyness I propose to name this species

Diomedea cauta *Diom vertice albo, faciei colore e margaritâ cinereo, dorso alis caudaque cinereo-fuscis, rostro pallidè vinaceo-cinereo, culmine, ad basin præsertim, flavo*

Crown of the head, back of the neck, throat, all the under surface, rump and upper tail coverts pure white, lores and line over the eye grayish black gradually passing into the delicate pearl gray which extends over the face, back wings and tail grayish brown, irides dark vinous orange, bill light vinous gray, or bluish horn-colour, except on the culmen where it is more yellow particularly at the base the upper mandible surrounded at the base by a narrow belt of black, which also extends on each side the culmen to the nostrils, base of the lower mandible surrounded by a belt of rich orange, which extends to the corners of the mouth, feet bluish white

Total length, 31 inches bill, 4½, wing 21½ tail 9 tarsi, 3

Hab Bass's Straits

The above are the dimensions of a female, the male is considerably larger

Nearly allied to but larger than *D melanophrys*

Thalassidroma Nereis *Thal gutture pectoreque fuliginoso-cinereis, dorso uropygio tectricibusque caudæ cinereis, abdomine lateribus et crisso albis*

Head neck and chest sooty gray lower part of the wing coverts, back, rump and upper tail coverts gray, each feather very slightly margined with white, wings grayish black, tail gray, broadly tipped with black, under surface pure white, irides, bill and feet black

Total length, 6½ inches bill, $\frac{9}{10}$, wing 5¼, tail 2½ tarsi, 1¼

Hab Bass s Straits on the south coast of Australia

This beautiful fairy-like Storm Petrel is about the size of *Thal Wilsoni*, and is remarkable as differing from most of the members of the group in having no white on the rump and in the pure white of the under surface

Mr Gould exhibited to the Meeting a new species of *Hypsiprymnus*, from Swan River, which he characterized under the name of

Hypsiprymnus Graii *Hyps fusco-cinereus, corpore subtùs albescente, caudâ mediocri fuscâ, flavo lavatâ, ad apicem albâ, pedibus pallide fuscis, auribus mediocribus rotundatis*

	unc	lin
Longitudo ab apice rostri ad caudæ basin	18	0
———— *caudæ*	11	6
———— *tarsi digitorumque* (sine unguibus)	4	3
———— ab apice rostri ad basin auris	2	4
———— *auris*	1	1

This species most nearly resembles the *Hypsiprymnus rufescens* of Mr Gray, but differs in being of an ashy brown colour above and in having the hairs which clothe the back of the ears of the same general colour as those of the head, instead of black as in the species just mentioned The fur is long, and soft to the touch, the hairs both on the upper and under parts of the body are of a palish grey colour at the base, those on the under parts are dirty white externally, and those on the back are dirty white (inclining to ash colour) near the *apex* and tipped with brownish black on the sides of the head and body a very faint yellowish hue is observable The ears are sparingly clothed within with small yellowish hairs, externally they are clothed with fur, like that on the head The feet are of a very pale brown colour The tail is brown, tinted with yellowish, excepting the apical third, which is covered with longish white hairs

December 22 —William Yarrell Esq Vice-President, in the Chair

A letter from Mr Frembly, R N, Corresponding Member Z S was read It is dated Gibraltar, November 28th, and refers to two species of Shark which that gentleman had forwarded for the Society s Museum

The following paper, being a continuation of Mr Broderip's descriptions of Mr Cuming s new shells, was read —

HELIX (COCHLOSTYLA) DAPHNIS *Hel testâ ovato pyramidali anfractibus 5 ventricosis ultimo cæteros conjunctos excedente, labii limbo castaneo-nigricante, apertura albidâ vel purpurascente*

Var *a* *Ochraceo-albida, anfractibus 2 ultimis vittis angustis serie duplice dispositis nigricantibus cinctis, fascia sub-basali vittis albido-ochraceis interrupta nigricante, apertura cæruleo-albidâ*

Var *b* *Sordidè albido-flava vittis fuscis creberrime cincta, apertura albida*

Var *c* *Sub-ochracea vittis raris distantibus rubro nigricantibus ornata anfractu basali fascia lata centrali rubro-castaneâ ochraceo subinterruptâ cincto, aperturâ subcæruleo-albidâ*

Habitant varietates *a*, *b*, *c*, ad Argao in insula Zebu

Var *d* *Sordidè ochracea lineis 3 fuscis, medio maximo clariore, cincta, aperturâ albidâ*

Hab ad Sibonga in insula Zebu

Var *e* *Albido flava strigis obliquis fulvis creberrimis ornata, et fasciâ basali latiore cincta, apertura albidâ*

Var *f* *Albens strigis obliquis creberrimis nigris ornata et maculis magnis nigris interdum fucata, fasciâ basali angustâ nigra, apertura cæruleo albente*

Habitant varietates *e*, et *f*, in insula Siquijod

Var *g* *Sordidè ochracea, strigis obliquis raris castaneo-nigricantibus fucata, basi nigricante ochraceo sordide fucata apertura purpurascente*

Var *h* *Anfractibus 2 primis albidis, tertio et quarto fuscis, ultimo* *sordide albido strigis rarissimis obliquis nigricantibus vix notato, aperturâ rubro-purpurascente*

Habitant varietates *g* et *h*, ad Argao in insula Zebu

The general size of this fine species is about 2½ inches long by 1¾ broad All the varieties were found by Mr Cuming in deep forests, on the leaves of trees In none of them hardly do the markings commence before the fourth whorl —W J B

Helix (Cochlostyla) Faunus *Hel testâ elongato-subpyramidali fuscâ anfractibus 6 subventricosis, labii limbo nigricante, aperturâ cæruleo-albida*

Var *a* *Fusca, strigis obliquis e castaneo nigricantibus creberrimis subobscurioribus ornata, lineis nigricantibus obscurioribus cincta, fasciâ lata basali nigricante*

Var *b*. *Fusca lineis creberrimis obscuris cincta strigis brevibus raris subobliquis juxta suturam notata*

Long 2 ad 2⅜, lat 1½ poll

Hab ad Sanctum Nicolam in insula Zebu

The variety *a* is the shortest The third specimen is deprived of its *epidermis* or nearly so, and the ground-colour is exposed The first four whorls are chestnut, gradually deepening in colour and the last whorl is of a rich purple brown the shell is obscurely banded especially on the last whorl

Mr Cuming found this species on the leaves of trees —W J B

Helix (Cochlostyla) Satyrus *Hel testa subpupiformi anfractibus 5 subventricosis, purpureo castanea, epidermide fuscâ, apertura ovata albida, labii limbo purpureo-castaneo*

Long 2 lat 1¼ poll

Hab in insula Tablas

Obscure oblique stripes and bands occur in some of the individuals of this species which though it approaches the last differs from it in many points, especially in the form of the *apex* and the shape and structure of the aperture

Found by Mr Cuming on leaves of trees —W J B

Bulinus

Bulinus Ægle *Bul testâ fulvâ, anfractu ultimo juxta suturam fasciâ angustâ et juxta basin fasciâ latâ medio pallidiore ornato, diaphanâ, lineis incrementi obliquis creberrimè striatâ, labii limbo castaneo-nigricante, aperturâ albente*

Long 1¾, lat 1¼

Hab ad Casan in insulâ Mindanao

The first four whorls are very pale, but the last is deep fulvous a white line runs round the suture of the body-whorl

Mr Cuming found this species in a dense forest, on the leaves of trees

Bulinus partuloides *Bul testâ pyramidali, nitidâ, apertura ovata columellæ basi subplicatâ, labii limbo complanato, latissimo, reflexo, albo*

Long 1¼, lat ¾ poll

Var *a* ***Flava, castaneo-vittata***

In this pretty variety a single chestnut band borders the base of each whorl, and on the body-whorl there is in addition a broad, subcentral, chestnut band

Var *b* *Castanea, albo vittata*

In this variety the rich chestnut is relieved by a white band that borders the upper part of the last two whorls near the suture

Var *c* *Castanea, fusco vittata*

In this variety the upper part of each whorl near the suture is banded with brown

Hab in insula Tablas —W J B

PLEKOCHEILUS

PLEKOCHEILUS GRACILIS *Pl testa elongata, gracili anfractibus* 4 *ultimo longissimè maximo subdiaphana anfractu basali transversim corrugato, strigis angulatis irregularibus longitudinalibus creberrime fucato, anfractibus cæteris subroseis, apertura subaureo-flavâ, labii limbo lato, reflexo, albo*

Long 1¾, lat ¾

Hab in insulis Feejee dictis?

Hitherto this form has only been discovered in the Western World Mr Cuming received the specimen above described from a captain of a ship who said he had got it from a native of one of the Feejee Islands A glance at the western species will satisfy the observer that the species above described is distinct —W J B

Mr Waterhouse exhibited two new species of Birds from the Society's collection, and pointed out their distinguishing characters The first is a small species of *Picus*, believed to be from the north-west coast of South America, and is remarkable for the absence of spots and markings, and the brilliant red colour of the upper parts of its body and wings this red colouring commences on the back of the neck, and is continued to the tail, as well as over the whole of the wings, that is over the visible portion of each feather, the inner shafts being of a brown colour The whole of the upper surface of the head is of a brown-black colour, the sides are pale brown, the throat is pure white, the chest and whole of the under parts of the body are of a dirty white colour, indistinctly tinted with yellowish The tail is of an uniform blackish brown colour, with the exception of the two outer feathers on each side, which are pale brown, on the apical half of the external feather there is a very obscure indication of bands The beak is of a very pale horn-colour

The principal characters may be thus briefly expressed —

PICUS CALLONOTUS ***Pi capite pallidè fusco, suprà fuliginoso, corpore suprà alisque sanguineis, gulâ, pectore abdomineque albescentibus, caudâ obscurè fuscâ, rostro albescente***

In size and general form this species agrees very closely with the ***Picus minor*** of Europe, but its beak is rather longer in proportion, being nine lines in length

The second new species is one of the Icterine group, and in most of its characters agrees with that division to which the term *Cassicus* is applied it has the same stout conical bill, the upper surface of which is broadly expanded at the base, and encroaches on to the forehead the *apex* is pointed This bird, however, differs from any other species of the group to which it belongs in the great length of its wings, which extend considerably beyond the tip of the tail, which is of moderate length, broad, and slightly rounded The colouring of the plumage is also remarkable, and particularly the texture of the feathers those of the body having a velvet like appearance, whilst those of the wings have a distinct gloss such as we see in the plumage of the Crows No doubt, according to the views of many ornithologists this bird would be regarded as a new genus or subgenus, the sectional name *Ocyalus* is therefore proposed from Ωχυαλος, in allusion to the swiftness with which it is to be presumed a bird with such wings would move

Subgenus Ocyalus

Characteres ut in Cassico, *alæ autem longissimæ et caudæ apicem transeuntes*

Cassicus (Ocyalus) Popayanus *Oc niger, corpore purpureo relucente, alis nitore viridi, capite nuchâque suprà castaneo tinctis cauda flava, rectricibus quatuor intermediis in toto nigris, sic et apicibus reliquorum, rostro pallido*

Long tot 11 unc , *rostri*, 1½, *lat ad basin*, 6¼ lin , *alæ* 8½ unc , *caudæ* 4

Hab Popayan

MICROSCOPICAL SOCIETY OF LONDON

At a meeting of the Microscopical Society, held August 18th R H Solly Esq , F R S in the chair, a paper was read from Dr Thomas Williams, in continuation of that of the Rev J B Reade, on the Stomata of Plants, wherein the author states, that by having recourse to the process of charring as described by that gentleman, he satisfied himself that the stomata in plants were closed by a pellicle, but from other experiments he infers, that this pellicle is formed by the air contained in the intercellular spaces and cells of the stomata, carrying before it, in its dilatation, a bubble of gelatinous mucus, with which the interior of the stomata are covered The summit of the vesicle thus produced when raised into contact with the heated glass, becomes carbonized, and being upon the same plane with the common surface, from the pressure of the plate of glass it appears as belonging to the epidermis, and extending from one edge of the aperture to the other He concludes by stating, that the natural condition of the stomata is that of patency , but in consequence of the inspissation of the organic mucus, under certain circumstances and in certain genera of plants, a pellicle is generated over their orifices

The Secretary, Mr John Quekett, then read a paper by himself on the Anatomy of four species of Entozoa of the genus *Strongylus* from the common Porpoise The author stated, that the subjects of his paper were, with one exception, all found in the lungs of the Porpoise Two of them had been long known and had been described by Rudolphi and many others under the names of the *Strongylus inflexus* and *minor*, whilst a third from the circumstance of its being found with the *inflexus*, had, by all others except Kuhn been described as a younger specimen of that species, but by him as the *Strongylus convolutus* whilst the fourth appeared hitherto either to have escaped notice, or else to have been confounded with the last, but his examinations of this Entozoon led him to consider it as a distinct species, and from the circumstance of its being inclosed in a sheath or case he had named it the *Strongylus invaginatus* at the suggestion of his friend Dr Willis The *Strongylus inflexus* was the largest of the Entozoa, and it occurred most abundantly in the bronchial tubes and in such numbers as almost to close them up, but many specimens were found in the right auricle and ventricle of the heart, and in the principal blood-vessels of the lungs as well The average length of the male is about seven inches, whilst that of the female is nine inches The next species was found in common with the last being twisted together in a knot around them both in the bronchial tubes and blood vessels, it has been noticed as the young of the *inflexus*, but, on comparison the author finds that the difference between the two is so marked as to leave no doubt of their being distinct species Kuhn has named it the *Strongylus convolutus* The third species is the smallest of the whole some specimens not much exceeding an inch in length, and from this circumstance has been named the *Strongylus minor* It occurred in the venous sinuses of the head and in the cavity of the tympanum, and some of them were of a reddish hue, probably owing to their living in blood The fourth species, the *Strongylus invaginatus* was found in small cysts in the lungs not connected with the blood-vessels, to the number of five or six in each cyst which were easily extracted when the cyst was opened the male was very much shorter than the female, and both were inclosed in a transparent sheath or case which was in contact with the body of the worm only at the head and tail

After describing the anatomy of each species, the author then proceeded to some interesting peculiarities connected with their ova, in which the gradual transition from vitelline globules to the perfect worm was beautifully seen He then alluded to the curious fact of the *Strongylus inflexus* and *convolutus* living in blood and in air, and concluded with mentioning some other interesting points connected with these Entozoa and the probable effects they produced in the œconomy of the animal The paper was accompanied with drawings and illustrative diagrams

Mr Ross exhibited to the Society a new form of the Microscope, in which strength, durability steadiness, and cheapness were combined, it was capable of exhibiting the usual test-objects and the price only 12*l*

MISCELLANEOUS

George-Town, July 30

"The industrious traveller, Mr Schomburgk arrived in town this morning from his first surveying expedition'—*Guiana Times*

We are glad to see a very pleasing and faithful likeness of our esteemed friend, with a memoir of his life in the 3rd volume on Ichthyology in the Naturalist's Library, which we have just received

Mr W S MacLeay writes from Sydney April 28, 1841, that he is much occupied with Natural History, and making large additions to his collection He gratifies us with good accounts of the health of his excellent Father, who is always most affectionately remembered here —R T

Mr W Francis writes to us from the Tyrolese Alps, where he is collecting plants and insects

ON THE NATURAL HISTORY OF THE HODESUM (IMPROPERLY CALLED KOLEHAN) BY LIEUT TICKELL

Singbhoom including the Kolehan lies between 21° 30′ and 23° north latitude and 85° and 86° east longitude it is bounded to the north by Chota Nagpoor and Patkoom, to the east by the Jungle Mehals and Baumunghatte, to the south by petty states, or tuppahs, subservient to Moherbunj and by Keonjur and to the east by Gangpoor and Chota Nagpoor These limits comprise a fine open tract of country, in most parts exceedingly productive, in others stony and barren, and separated from the circumjacent countries above enumerated by rocky hills and jungles Singbhoom Proper consists of an extent of fine open arable land to the north of the Kolehan, above 45 miles east and west, and about 18 in breadth, comprising the talooks of Khursawa, Kera and Seryekela, also a portion of similar land, about 20 miles square, to the north-east called Koochoong, attached to Seryekela, and along the west of the Kolehan, an imperfectly defined extent of mountains and jungles, including Porahaut and Anundpoor

The Kolehan, as now constituted, comprehends a tract of open undulating country, averaging from sixty miles in length north and south, from thirty five to sixty in breadth It is divided into two departments by a step about 500 feet high, running east and west across it The southern part is rich in soil, and beautiful in appearance, but an absence of inhabitants and proper culture gives it an air of desolation This happily is becoming fast remedied by the return of large families of Bhooians, former inhabitants, who had been expelled by the Hos The lower country north of the step is exceedingly populous, but in many parts stony and barren The westerly Peers are situated among hills and vast jungles, containing a few fertile valleys, and Sarnda, in the far south, is one mass of mountains clothed in forests, where the miserable inhabitants, few and solitary, can scarce struggle for mastery with the tiger

The whole of this country is traversed by numerous streams of great beauty, but useless as water-carriage, being almost dry in the hot weather, and rapid torrents in the rains The *Sunjye*, separating the Kolehan from Singbhoom, rises to the north-west of Porahaut, and enters the Kurkye near the junction of that river with the Soobum rekha, the Roro, twelve miles south of the former a narrow but deep and swift stream and the Eeleegarra and Toorul still further south take a like course above the step, the Des Nye runs westward and falls into the Kolekaro, near its confluence with the Koil, and near the southern limits of the Kolehan, the different streams take a south and west direction, falling into the Bhundun and Byturnee which last, running through vast and lonely forests, separates the Kolehan from Jushpoor and Rorwan in Moherbunj and Kalkapershaud in Keonjur There are two water-falls on the borders of the Kolehan which I have never visited, but which, by the description of the natives must be well worth seeing The Bunnye running between Sonepoor and Singbhoom, is said to roll its waters into a profound cave, from which spot it pursues its course underground, and is supposed to join the Kole Karo The fall is called Paraa ghag and is a tiruth but so remote from habitation and buried in such deep woods as to be seldom visited except by the Sonepoor Koles and Bhooians of Porahaut and Bundgaon On the confines of Baumunghattee also is a singular cascade described to me as a single thread of water pouring down a wall-like precipice of 200 or 300 feet in height It is called by the Baumunghattee Oorias, Muchkandnee Jhurna, and by the Koles Hakoo-yamdah, meaning in either language, "The fall of the weeping-fish," from some whimsical story of the fish complaining of the impossibility of scaling the cataract, to emerge from the dreary abyss, through which the stream winds below The peculiar distribution of the hills in this country, running in parallel ranges, precludes the formation of lakes, which are unknown

These ranges are not of very great height the loftiest, which are in Saruda, not appearing above 1000 feet above the plain They are however intersected in parts by profound valleys, which give the hills, from that side, an appearance of great magnitude They are chiefly quartz, in all stages of decomposition, permeated by limestone rocks, smaller detached ranges, issuing at right angles to these, are commonly of micaceous slate From Chyebassa, proceeding easterly into Koochoong, are low ridges perfectly parallel about half a mile to a mile apart, gradually increasing in height till the series is closed by the Choivria hills in Koochoong They are composed of loose rocks, resembling (if they are not) clink stone, but the larger ridges are of coarse granite The northern part of the Kolehan consists in a great measure of sterile plains, scattered with quartz boulders, stones, and pebbles, some crystallized The beds of the nullahs are a shingle composed of jasper (of all hues), green-stone, quartz pebbles, and flint The bed of the Byturnee is lined with flattened pebbles and lumps of jasper of bright yellow, red, purple, and black, disposed in parallel streaks or ribbons, as if artificially inlaid The corundum is found in great quantities at Juggernathpoor on the upper step of the Kolehan, and several nullahs run through beds of argillaceous earth, from the brightest scarlet to pure white, which are highly in request among the natives The whole of these streams wash down more or less gold, but the Koles know not how to collect it In Singbhoom a tolerable quantity is gathered by Hindoos but of a third- or fourth rate quality, also excellent iron , of coal I never found any traces

The open parts of the Kolehan are here and there scattered with a scrub-jungle, composed chiefly of the Polass and Assun on which latter the tusser silk-worms are bred The southern parts where not cultivated, are covered by extensive plains of grass, interspersed with bushes , entirely along the west boundary are forests of saul trees, small and meagre on the hills, but reaching in the low rich valleys to a size perfectly prodigious In Anundpoor towards Gangpoor are tracts covered entirely with the wild plantain, and many of the hills are clothed densely with bamboos In marshy spots a strong serviceable species of cane or ratan is found The wild mango tree is also very common in these forests yielding a fruit far preferable to the common kind found in the " topes ' throughout India , it is small, round and full of juice, as sweet as honey The date and palm trees are not cultivated by the Koles but are to be found near Hindoo villages in Singbhoom , cheretta wild indigo, and arrow-root are very common in the jungles But to enumerate all the beautiful flowers which enrich these green retreats—the fruits and roots to every one of which the natives attach some specific virtue or harm , the inexhaustible variety of plants shrubs and fungi ferns, creepers, &c which clothe in all varieties of fantastic imagery, the shady dells , or the cool banks of foliage canopied streams,—would be a task far exceeding my powers or the limits of this memoir

The animals found in the Kolehan are the same as in other parts of Central India, but not nearly so abundant as in better-watered jungles , besides which, the Koles and Oorias are inveterate hunters and their attacks on game of all kinds are pursued on an exterminating scale

The elephant which is numerous in parts of the Jungle Mehals, comparatively close to Medneepoor is strange to say unknown among the remote and wild regions of West Singbhoom , the gowér is common in this latter region—two species are described by the natives, a red and a black kind , the urna and smaller wild buffalo are very numerous about Anundpoor , great varieties of deer haunt the hills, the saumúr (*C rusa*), neelgye (*Damalis picta*) spotted deer (*C axis*), barking deer or Muntjac (*C muntjac*), chikerac or four-horned deer (*C chicquera*) all these species though so shy when sought after as to be seldom met with, must be tolerably numerous from the depredations they commit on the fields of gram boot, moong oorid, &c which are planted near the jungles The memina, a species of mouse deer, is also found among rocks and underwood The antelope is confined to the wide open plains of Chynpoor in Singbhoom, and very limited in number Tigers and leopards abound Bears infest almost every clump of rocks throughout the plain , they are all of the long lipped species (*Ursus labiatus*) Hyænas inhabit similar localities, but are rare There are no *wolves* but there appear to be two distinct species of the jackal (*C aureus*), one of which is much larger, stouter and ruddier than what I remember of the jackal of Bengal The cry also is different, and is a wailing sound, not much unlike, though infinitely louder than, the mewing of a cat at all events the Koles distinguish the two animals, calling the large kind (from its cry) *Tow Koola,* and the common jackal *Kurmcha* The little Bengal fox or corsac (*Cynalopex insectivorus*) is very numerous, yapping all the clear nights long during the cold season The Indian badger or ratel (*Ratelus melivorus*) is found in the woods but rarely Porcupines (*Hystrix*) are numerous, but being nocturnal are seldom seen The short-tailed manis (*M crassicaudata*) is met with among rocks, but is one of the rarest animals known There are three kinds of squirrels the common palm-squirrel (*Sciurus striatus*), the great red squirrel (*Sciurus macrourus*), and a large gray flying squirrel peculiar, I believe, to the Kolehan and the Jungle Mehals This last is exceedingly rare, as it lives on lofty trees in profound forests and only moves forth at night The wild dog (*Canis primævus*), *Koohia* and *Sona-kookoor* of the Oorias, and *Tannee* of the Koles, roams through the jungles in packs, occasionally visiting the flocks and herds on the plains Their ferocity speed and cunning have gained them a superstitious veneration among the Koles, and dread of their retaliating on their cattle deters the villagers from killing them Of these also there are said to be two kinds, a large dog, in shape and colour like a Scotch greyhound or lurcher, which hunts by sight, and a smaller, red, bushy-tailed dog, which follows the other in packs of five to twenty, is less speedy and hunts by scent The hare is larger than that of Bengal, inhabits gravelly ravines in scrub-jungle and never takes to grass Of monkeys there are only the two common species, the Lungoor and Mákor or Bunder (*Sara* and *Gye* of the Koles) the former live among rocks, the latter in dense thickets Wild hogs are very numerous in some parts, but so wary as to be seldom killed The rhinoceros is not known

Birds of all kinds are scarce and wild, especially those fit for food, on account of the keenness with which the Koles pursue, trap, hawk and shoot them The double-spurred partridge is found among rocks, but is one of the most difficult birds to shoot, as it seldom takes wing but creeps into caves and fissures The deep moist woods afford immense varieties to the ornithologist

Being a dry and stony country, the Kolehan is peculiarly prolific in snakes of all varieties the covra is not so common as another species, the *Siarbinya* of the Oorias, and *Pago jarras* of the Hos (*Cophias Russelii*), which is supposed to be equally deadly and far more vindictive, it is a subgenus of rattle-snake (without the rattle) A large and beautiful snake, coloured with black and yellow rings, the *Sakom bing* (*Pseudoboa fasciata*), is met with in ploughed fields, a long thin green whip-snake infests the rank grass-jungles at the bottoms of hills, the hartoo, a slender agile species, coloured like a ribbon with yellow and coppery purple, infests trees all these are venomous The Python or Ujgur (*Toonil bing*) is found in every jungle, it attains to dimensions which I have heard described, but which would sound too marvellous to be recorded without better proofs Throughout Singbhoom, Chota Nagpoor, and the surrounding countries, a belief is current of a monstrous species of snake, the

Garra bing infesting rivers swollen by torrents, which destroys both men and cattle should they venture in I mention it, as the opinion is so general, but it is probable that the sudden and mysterious deaths which occur in these mountain-torrents are occasioned by what seamen call the "under tow' and 'back water,' caused by the violent passage of water over rocks and deep holes The body of a person thus carried away is never seen again, at least in the neighbourhood and this total disappearance naturally strengthens the idea of his having been swallowed up by some huge animal

An entomologist would find an exhaustless field of research and discovery in the jungles of this country The decayed saul trees are tenanted by magnificent species of *Prionus* and *Cerambyx*, the rocks contain endless beautiful varieties of Coleoptera, the deep woods, everywhere during the rainy season brilliant with odoriferous flowers, are enlivened by Lepidoptera of the gaudiest colours, and numberless varieties of grotesque shapes in the Mantides Phyllia and Grilli, infest every thicket while tribes of ants bees and wasps attract attention by the beauty and ingenuity of their habitations and nests in the forests Of the former, one of the commonest species is remarkable for traversing the jungles, and marching along the paths in procession two or three abreast and of prodigious extent Scorpions and centipedes are fearfully common of the former a species infests caves and fissures in rocks and attains such an enormous size, that had I not heard the animal described by several people (of different classes) and had reason to be satisfied of the general truth of their assertions, I should have looked upon the whole as a chimæra In dry konkerous soils, the white ants are a scourge, they appear, in woods, to be a kind of vegetable scavenger, reducing to powder the logs which lie on the ground in a short space of time

Fish are abundant in every largish stream, retiring in the dry season to the deep pools, which are left when the main channel has run dry, but the Koles, by poisoning the water, destroy inordinate quantities The mahseer and the little fly-taking Cyprinus, miscalled 'trout in Upper India, are not found in these lower latitudes Doubtless these running jungle streams produce many undiscovered varieties of fish but unfortunately, to this branch of natural history I turned no attention during my stay in the country

The climate of the Kolhan has been found to be on the whole healthy, although the station of Chyebassa which was unfortunately selected hurriedly, and without sufficient examination and comparison with surrounding spots, is not a favourable sample, situated on a barren, gravelly plain, interspersed with brushwood, and near piles of bare rocks The heat during the day is excessive, but the nights are invariably cool, and the air invigorating and exhilarating, in spite of the temperature, owing probably to its peculiar dryness A mile only to the south east, at the village of Tambore, the country rises in undulating meadows, beautiful in appearance as an English park, and infinitely cooler than Chyebassa These advantages in forming the cantonment were either overlooked or thought of less note than the nearer vicinity of water, Chyebassa being on the banks of the Roro The Hos are more free from disease than any other people, in consequence of the precautionary measures they take—their nutritive food and drink, and the open airy positions they build in As a guard against infection or fire, their villages are small and scattered, and on the first appearance of any epidemic they leave their houses and flee into the jungles, living apart from each other Singbhoom, on the contrary from the obverse manners of the Oorias is yearly scourged by cholera, fevers and small-pox This latter disease, propagated by the Bramin inoculators, has within the last year spread with fearful havoc into the Kolehan, and most unfortunately simultaneously with the introduction of vaccine, to which the evil has alone been attributed The rains are not heavy in the Kolehan, but the monsoon is accompanied by violent storms of wind from the north west, with severe thunder and lightning causing many fatal accidents None of that sultry oppression incident to Bengal is felt at that time of year The cold season is truly luxurious—' a nipping and an eager air" without fogs or mists March April and May are generally the only unpleasant hot months of the year, during this period not a drop of water falls occasionally for upwards of six weeks the aspect of the country loses every trace of verdure, and the dried stony soil reflects with unbearable force the rays of the sun Vegetation is vigorously restored on the commencement of the rains and as these are not accompanied by the gloomy sky and unceasing torrents which fall in the plains of India the landscape is pleasingly chequered by passing showers, and the tender foliage of the forests glistens alternately with golden breaks of sunshine or mellowed shades of green To the south and east of Singbhoom and in the most dreary and deserted parts of the country, are remains indicative of the former presence of opulent and industrious people but so decayed by time and engulfed in the labyrinths of untenanted forests, as to be unmarked by any record or history, save that they must have been of prior origin to the first known Bhooians of the country —*Journal of the Asiatic Society of Bengal, No* 19

Fossil Foraminifera in the Greensand of New Jersey —Prof J W Bailey, in a recent visit to the cretaceous formations of New Jersey, has brought to light the interesting fact, that a large portion of the calcareous rock defined by Prof H D Rogers as the third formation of the upper secondary is made up, at the localities where he examined it, of great quantities of microscopic shells belonging to the Foraminifera of D Orbigny, which order includes those multilocular shells which compose a large part of the calcareous sands, &c of Grignon and other localities in the tertiary deposits of Europe Since the minute multilocular shells above alluded to were discovered, Dr Torrey and Prof Bailey have together examined specimens of limestone from Claiborne, Alabama and have found in them Foraminifera, of forms apparently identical with those occurring in New Jersey None of this order except the genus Nummulite have heretofore been noticed in our greensand formation In this connexion we may also announce the interesting discovery recently made by Prof Wm B Rogers, of

A vast Stratum of Fossil Infusoria in the Tertiary Strata of Vir-

ginia —It occurs about twenty feet in thickness, beneath Richmond, and is found to be filled with new and highly interesting forms of *marine* siliceous Infusoria —*Silliman s Journal July* 1841

Mr R C Taylor s Model of the Southern Coal-Field of Pennsylvania —At the Second Annual Meeting of American Geologists, held in April last, Mr Richard Cowling Taylor, F G S exhibited a highly interesting model in plaster of the Dauphin and Lebanon coal region embracing altogether an area of seven hundred and twenty square miles showing the range of the mountain elevations, with their relative height and position, also their elevation above tide level, the dip of the rocks the position of the coal seams, and much other useful information

Mr Taylor accompanied this exhibition with remarks explanatory and statistical in relation to this coal region and made some observations on the importance of this mode of exhibiting the geological features of a country, expressing the hope that the day would come when models of this kind, representing the several states and even the whole United States, shall be constructed He also enlarged upon the propriety of following as closely as possible the actual conformation of the country in drawing sections and of adopting uniform modes of illustration by colours, &c , and the importance of an equal scale of extension and elevation as far as practicable in such sections —*From Silliman s Journal, July number* where the remarks are published entire, with a coloured section

METEOROLOGICAL OBSERVATIONS FOR AUG 1841

Chiswick —August 1 Slight rain cloudy and fine 2 Fine with clouds rain 3 Hazy cloudy and mild rain 4 Cloudy and fine 5 Fine slight rain 6, 7 Fine 8 Rain cloudy and fine 9 Very fine 10 Very fine rain 11 Stormy and wet 12 Fine 13 Cloudy 14 Rain showery clear at night 15—17 Cloudy and fine 18 Hazy fine 19, 20 Very fine 21 Cloudy 22 Cloudy slight rain 23 Rain cloudy and fine 24 Showery clear 25 Drizzly 26 Hazy and mild 27 Heavy dew cloudy and hot 28—30 Foggy in the mornings very fine evenings clear 31 Overcast and fine

Boston —August 1 Fine rain P M 2 Fine 3 Cloudy rain P M 4 Fine rain early A M 5 Cloudy rain P M 6 Cloudy and stormy 7 Cloudy rain P M 8, 9 Cloudy 10 Fine 11 Cloudy rain early A M rain P M 12 Stormy 13 Cloudy 14 Cloudy rain early A M 15 16 Cloudy 17 Fine rain P M 18, 19 Fine 20 Fine thermometer 77° half-past two P M 21 Fine rain A M 22 Fine 23, 24 Fine rain early A M 25 Rain rain early A M 26 Cloudy thermometer 75° three-quarters past two P M 27 Fine thermometer 75° quarter past eleven A M 28, 29 Fine 30, 31 Cloudy

Applegarth Manse, Dumfries shire —August 1 Fair, but cool and cloudy 2 Fair and fine 3 Wet A M cleared and was fine 4 Fair and fine 5 Rain all day 6 Wet A M cleared and was fine 7 Wet, slightly 8 Fine though showery thunder 9 Wet A M became fine 10 Showery 11 Fair 12 Showery all day 13 Partial showers 14 Wet A M became fine 15 Fine till P M then rain 16 Wet A M cleared P M 17 Fair throughout 18 Fair A M wet P M 19 Fair and warm air electrical 20 Wet nearly all day thunder 21 Wet P M flood 22 Fine and fair 23 Occasional slight showers 24 Wet P M and evening thunder 25 Showery 26 Rain early A M cleared 27 Fine one shower A M 28 Wet morning cleared 29 Fine but cloudy 30. Wet all day 31 Fair and fine

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr Roberton, *by* Mr Thompson *at the Garden of the Horticultural Society at Chiswick, near London, by* Mr Veall *at Boston, and by* Mr Dunbar *at Applegarth Manse, Dumfries-shire*

Days of Month 1841 Aug	Barometer						Thermometer									Wind				Rain				Dew-point
	London Roy Soc 9 a.m	Chiswick		Boston 8½ a.m	Dumfries-shire		London Roy Soc			Chiswick		Boston 8½ a m	Dumfries shire		London Roy Soc 9 a m	Chiswick 1 p m	Bost.	Dum fries shire	London Roy Soc 9 a m	Chiswick	Boston	Dumfries shire	Lond. Roy Soc 9 a.m
		Max	Min.		9 a m	8½ p m	Fahr 9 a m	Self register Max	Self register Min	Max	Min		Max	Min.									
1	29 830	29 923	29 790	29 30	29 68	29 75	58 3	65 2	50 0	66	49	57	61	49	NW	SW	calm	WNW	055	02			54
○ 2	29 986	29 937	29 765	29 42	29 75	29 67	62 5	64 0	54 0	70	58	61	62½	44	WSW	SW	NW	SW	005	38	05		55
3	29 742	29 691	29 411	29 16	29 53	29 38	62 8	70.8	60 4	73	57	64 5	63	53½	NNW	SW	calm	SSW	377	38			59
4	29 492	29 785	29 385	28 94	29 53	29 60	60 0	71 0	59 0	69	57	63	65½	51	N	N	N	S	366		86		58
5	29 796	29 742	29 609	29 17	29 42	29 21	65 0	69 0	60 0	64	57	64	71	53	SW	SW	SE	E		01			61
6	29 748	29 851	29 663	29·05	29 34	29·55	60 6	66 0	58 5	67	57	62	60	54	W	W	W	W	008	07	06		57
7	29 962	29 893	29 798	29 33	29 59	29 50	64 0	69 5	60 5	74	58	62 5	61	52½	W	W	calm	SSW	088			1 47	57
8	29 738	29 716	29 619	29 12	29 38	29 41	61 0	71 4	59 5	67	52	63	60	55½	SSW	S	W	SW	008	01	01		59
9	29 646	29 684	29 596	29 04	29 39	29 38	59 5	69 0	56 0	70	49	60	59	50½	W	W	calm	W		01			57
☾ 10	29 874	29 800	29 678	29 26	29 49	29 58	61 0	72 5	53 0	68	55	61 5	58	48	SW	S	SW	SW		36			56
11	29 512	29 662	29 458	28 95	29 49	29 56	61 4	67 5	58 0	68	46	60	60	45	SW	SW	S	NW	277	30	61		59
12	29 958	29 923	29 888	29 34	29 70	29 74	59 2	68 0	51 0	65	41	57	61	44	W var	NW	W	NNW	080		45		51
13	29 928	29 886	29 772	29 36	29 65	29 61	62 0	64 0	61 5	70	54	60	61	42	W	S	W	E	013	30			56
14	29 646	29 719	29 599	29 08	29 39	29 44	62 0	66 5	57 0	72	54	61	62½	53	SW	SW	SW	SW	213	04	25	0 28	58
15	29 766	29 746	29 687	29 16	29 49	29 62	64 5	68 6	57 0	70	50	61 5	67	55	W	SW	calm	W	036				59
● 16	29 928	29 921	29 851	29 32	29 72	29 72	61 5	71 6	56 0	74	58	60	64	45	WNW	S	calm	SW	011				57
17	30 018	30 056	29 969	29 35	29 73	29 94	64 5	71 5	60 0	75	56	63 5	62½	54	SW	W	W	NW					60
18	30 210	30 173	30 140	29 61	30 00	30 04	63 7	73 0	58 4	76	56	62 5	64	43½	NW	W	calm	NW			01		60
19	30 276	30 197	30 006	29 60	30 00	29 95	63 5	69 5	56 0	77	47	61	61½	53	WSW	SW	calm	S					57
20	30 006	29 734	29 629	29 37	29 75	29 64	66 5	73 0	56 0	80	51	66	69	58	SSE	W	S	W					59
21	29 684	29·903	29 797	29 00	29 55	29 52	66 7	77 5	53 0	72	48	67	61	49	W	S	SE.	NW				2 00	63
22	29 978	29 874	29 800	29 36	29 65	29 48	63 0	73 0	56 0	68	54	59	61	48½	SW	S	calm	E		58	12		56
☽ 23	29 904	29 884	29 797	29 30	29 60	29 78	58 0	68 0	57 0	72	44	57	63	49	WNW	W	calm	W	416	01	18		57
24	30 124	30 094	30 048	29 36	29 94	29 94	57 0	67 5	50 5	67	45	56	61½	41½	WNW	N	NW	WNW	015	13	04		48
25	30 148	30 079	30 059	29 44	29 83	29 90	57 0	65 0	52 0	67	60	55 5	64½	50	SW	SW	NW	SW	130	07	21		
26	30 268	30·225	30 181	29 59	30 00	30 10	63 2	65 5	57 0	79	62	64	63	55	W	SW	calm	SW	061				61
27	30 332	30 244	30 142	29 59	30 07	30 00	69 7	70 0	65·0	81	51	69	65½	56½	W	SW	calm	SW	011				64
28	30 264	30 189	30 125	29 54	30 01	30 03	62 7	76 5	59 5	77	52	62 5	65	54	W	W	calm	W				1 26	59
29	30 236	30 159	29 920	29 55	29 92	29 85	65 4	72 5	59 0	81	51	65	66	54½	WSW	SW	calm	SW					62
30	30 064	29 998	29 840	29 35	29 73	29 60	63 5	77 0	60 0	80	67	65	61	56½	W	S	calm	SSW					60
31	29 826	29 844	29 729	29 16	29 69	29 80	66 7	76 0	63 0	74	45	65	62	50½	W	NW	calm	WNW		02			63
Mean	29 932	29·920	29 798	29 29	29 680	29 716	62 5	70 0	57 2	72 03	52 93	61 8	62 1	50 5					Sum 2 168	2 69	2 85	5 01	Mean 58

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY

No 50 NOVEMBER 1841

XIX —*Description of some new Species of Ammonites found in the Oxford Clay on the line of the Great Western Railway near Christian Malford* By Samuel Peace Pratt, Esq , F L S , F G S

[With Four Plates]

The cuttings for the Great Western Railway between Chippenham and Wootton Basset having been almost entirely in the Oxford clay, and having exposed nearly the whole of that deposit, numerous fossil remains have been discovered, including many new species The Oxford clay, in this neighbourhood, forms three distinct beds, viz the upper and lower blue clays, separated by the ferruginous Kelloway rock, and each division has its distinct fossils, although several species are common to each of the three divisions Besides the undescribed species, many have been found throughout the series which had hitherto been considered as characteristic of either higher or much lower beds, thus *Ostrea deltoidea* and *Gryphæa virgula* are numerous in both the upper and lower beds, though formerly considered to be confined to the Kimmeridge clay, and several shells belonging to the inferior oolite, as *Astarte modiolaris* and *Lima proboscidea,* with some others, are found in the upper beds near Wootton Basset In the neighbourhood of Christian Malford, about four miles from Chippenham, the site of the Kelloway rock appears to be represented by a bed of gravel a few feet in thickness, which, besides the usual fossils of that bed, contains also numerous rolled specimens from the neighbouring hills of coral rag and calcareous grit Bones of the Elephant and other mammalia have also been found in it Beyond the gravel to the N W , in the direction of the rise of the strata, the clay assumes a slaty character, and contains numerous fossils, chiefly peculiar to the spot, such as ten or twelve species of Ammonites, more than half of which are undescribed, several species of Belemnites, Sepiæ, Fishes, and numerous shells, which although much compressed are beautifully perfect

The Ammonites are remarkable for having the aperture in a nearly perfect condition, but from their flattened state it is often difficult to determine their distinctive characters, this has however been attempted in the following descriptions, which have been drawn up after an inspection of several hundred specimens, and of a few individuals, which, having fortunately been found in indurated nodules in the clay, and thus preserved from compression, exhibit characters which the usual state of the fossils do not afford The specimens described are partly from the author's collection, and partly from that of the Bristol Institution, which possesses an extensive series of fossils found in the same locality, collected by the zeal of Mr S Stutchbury Some apology may seem necessary for having employed proper names so extensively in the designation of the species, but in a genus, the general characters of which are so similar, and in which the species are so numerous, it is difficult to find characteristic distinctions this genus has also, by almost general consent, been adopted to commemorate the names of individuals, who have distinguished themselves either by their discoveries in the science, or by their love and patronage of it

1 *Ammonites Elizabethæ* Pl III fig. 1, 2, 3, 4

Shell angular, arising from a series of spines on each dorsal edge, and two rows of tubercles on the sides of the volution, one near the middle, another smaller and compressed near the inner margin, radiated, the rays varying very much in number and elevation, curved or undulated, but becoming angular near the aperture of the adult shell, which has on each side a long, narrow, spatulate projection, the prolonged rays forming waves or loops on its surface, volutions six or seven, about ⅔rds exposed, back narrow, concave, the rays passing over it and forming low obtuse ridges, siphunculus not visible

The number and length of the spines and tubercles, and the mode in which they are combined with the rays, appear to indicate several distinct species, but on closer examination it is seen that all the varieties pass into each other, the same specimen sometimes containing more than one form

The spines and rays vary from sixteen to upwards of sixty on the last volution, and they are large and elongated in proportion to the smallness of their number, in the simplest form, a single irregular ray, terminated on the dorsal edge by a long sharp spine, connects it with the tubercles, scarcely reaching the inner one in others, two, three, and sometimes four rays arise from the spine and unite in the middle tubercle The prolongation of the aperture appears to depend upon the growth of the shell, and it varies from a slight projection to 1½ inch long, it is concave externally and convex internally

2 *Ammonites Comptoni* Pl IV fig 1

Shell discoidal, radiated, the rays alternately two short and one long, the long rays proceeding from the dorsal to the inner margin, where they become thickened, the two short rays not passing beyond the middle of the volution, they are curved backwards near the dorsal edge in the young shell the rays are close, sharp, and slightly elevated, when full-grown the last volution has a few obtuse undulations, but is nearly smooth, back rounded, with a slight depression in the middle, formed by the nearly meeting rays, the whole shell without spines or tubercles, volutions 6 or 7, ⅔rds exposed, aperture terminated on each side with a spatulate projection about 1½ inch long when fully grown, and of similar characters with *Am Elizabethæ*

3 *Ammonites Stutchburii* Pl IV fig 2 and 3

Shell discoidal, radiated, the rays curved, very regular, forming raised lines which reach from the dorsal edge to about the middle of the volution, where they meet a row of small, compressed, distant tubercles, beyond which is another row near the inner margin, these tubercles vary much in number and relative size, volutions ⅔rds exposed, aperture forming a projecting beak, with waved striæ on its surface, back narrow, marked by the rays passing over it, and terminated on each edge by a range of serrated sharp points formed by the termination of the rays, volutions exposed, showing both ranges of tubercles

4 *Ammonites Sedgwickii* Pl V fig 1

Shell discoidal, nearly smooth on the last volution, but having a row of tubercles upon the inner margin, the spaces between them twice as large as the tubercles in the young shell sharp raised lines proceed from the rounded back to about the centre of the volution, but do not reach the tubercles, they become indistinct towards the aperture, volutions ¼th exposed, the last about half the diameter of the shell, aperture not projecting, forming a well-defined twice-curved termination

5 *Ammonites Lonsdalii* Pl V fig 2

Shell discoidal, radiated (when young) with numerous waved, well-defined, raised lines, which become more obtuse and fewer as the shell increases in size, near the aperture they pass into fine striæ, the rays rise from the dorsal edges, and scarcely reach the middle of the side, the aperture forms a regular concave termination, except on the inner edge, where it bends back like the handle of a sickle, volutions ⅓rd exposed, the last more than half the diameter of the shell

6 *Ammonites fluctuosus* Pl VI fig 1 and 2

Shell discoidal or lenticular, radiated (when young) with numerous sharp raised lines, which are alternately long and short, the short combining in twos or threes with the longer ones about the middle of the side, some remaining distinct as the shell advances in age the inner half of the long rays becomes much thickened, until they form obtuse elevated ridges, with broad, concave, smooth spaces between, the short rays gradually disappearing, volutions numerous, ⅔rds exposed, shell reaching 6 inches in diameter, without any appearance of projecting aperture

7 *Ammonites Brightii* Pl VI fig 3, 4

Shell discoidal, nearly smooth, but having several flat, obtuse ridges arising from the dorsal edge, which combine a little beyond the middle of the volution into a compressed elongated tubercle which reaches the inner margin, the tubercles are about one-third as numerous as the ridges, and meet them in a rounded right angle in the young shell they are hardly visible, and also become obsolete near the aperture, the sides of which suddenly contracting to about one-third, again expand into a transverse oval projection, finely waved or striated, the back of the shell also projects in a point, and forms with the sides a concave arch, a sharp ridge on the back marks the siphunculus, volutions about 7, ⅔rds exposed

8 *Ammonites Gulielmi,* Sowerby, Min Con, pl 311

This species differs considerably from the description given by Sowerby, although there can be no doubt of its being the same shell, when fully grown to about 5 inches in diameter, the inner thickened rays form strong, elevated, compressed spines or tubercles

Ammonites sublævis, Am lenticularis, and *Am mutabilis*, and some other indistinct species, are also found in the same locality, generally compressed

DESCRIPTION OF THE PLATES

All the figures are of the natural size, with the exception of Fig 1 Pl VI, which is about one-half

PLATE III Fig 1, 2, 3 *Am Elizabethæ*
1 Simplest form
2 Most usual character
3 An uncompressed specimen
4 Exhibits characters proving the specific identity of Figs 1, 2, 3

PLATE IV Fig 1 *Am Comptoni*
2 *Am Stutchburii*
3 Part of the aperture of ditto

PLATE V Fig 1 *Am Sedgwickii*
2 *Am Lonsdalii*

PLATE VI Fig 1 *Am fluctuosus*, half the natural size
2 Ditto young
3 *Am Brightii*
4 Ditto uncompressed

XX —*A List of Testaceous Mollusca collected in the Shetland Isles during a few days' residence there in the autumn of this year, and not noticed by Dr Fleming in his 'History of British Animals' as indigenous to that country* By J GWYN JEFFREYS, Esq, F R & L S, &c

1 *Helix alliacea* (var) At Lerwick, under stones near the sea shore

2 *Rissoa purpurea* (n s) At Scalloway

3 *Pyramidella* (?) *interstincta* [Odostomia interstincta, *Fleming*] In Lerwick Sound, among coral

4 ——— (?) *insculpta* [Odostomia insculpta, *Fleming*] With the last

5 ——— (?) *pallida* [Phasianella pallida, *Fleming*] With the last

6 *Eulima Donovani* [Phasianella polita, *Fleming*] Lerwick Sound not uncommon

7 *Natica Helicoides* Dr Johnson in Trans of Berwickshire Nat Hist Society One specimen (the second which appears to have been recorded) was found by me while dredging in Lerwick Sound, it presents some generic differences (particularly in the aperture and umbilicus) from *Natica* The figure in the Transactions of the Berwickshire Natural History Society is erroneously represented as reversed, and in other respects does not give a good idea of the shell

usus albus (n s) In Lerwick Sound, a single specimen, but very distinct from any of its congeners

9 *Trichotropis acuminatus* Jeffreys in 'Malacological and Conchological Magazine,' No II p 36 In Lerwick Sound not uncommon I found one specimen of the *Chiton albus* which was half an inch long

Pecten obsoletus var *omnino alba* In Lerwick Sound only one specimen

10 *Crenella elliptica* Brown [Mytilus decussatus, *Montagu*] In Lerwick Sound not uncommon

11 *Arca fusca* In Lerwick Sound a single valve

12 *Montacuta substriata,* Turton Lerwick, attached to the ventral spines of the *Spatangus purpureus* its usual habitat

13 ——— *ferruginosa* Turton Scalloway a single valve

14 *Lucina lactea* At Scalloway rare

15 —— *spinifera* [Venus spinifera, *Montagu*] In Lerwick Sound rare

16 *Cyprina minima* Turton In Lerwick Sound not uncommon

17 *Astarte? triangularis* [Mactra triangularis, *Montagu*] In Lerwick Sound, one specimen only

18 *Venus Virginea* and var *Sarniensis* Turton Lerwick not uncommon

19 *Anatina prætenuis* Lerwick and Scalloway rare

20 *intermedia* Jeffreys in 'Malacological and Conchological Magazine' No II p 45 In Lerwick Sound not uncommon

21 *Psammobia florida* In Lerwick Sound not uncommon

Swansea, Sept 1841

XXI —*Brief and Practical Instructions for the Breeding of Salmon and other Fish artificially* By Sir FRANCIS A MACKENZIE, Bart

IN the autumn of 1840, having chosen a brook flowing rapidly into the river Ewe, a hollow spot adjoining to it was selected and cleared out, of the following dimensions length 23 yards, breadth from 12 to 18 feet, and all large stones having been taken away, the bottom was covered 1 foot thick with coarse sand and small gravel, the largest stones not exceeding the size of a walnut A stream from the brook was then led into this hollow, so as to form a pool of about 8 inches in depth at the upper and 3 feet at the lower end, thus giving it one uniform gentle current over the whole pool, whilst the supply of water was so regulated by a sluice as to have the same depth at all times, and a strong stone wall excluded all eels or trout, so destructive both to spawn and fry

On the 13th of November, four pair of salmon, male and female, were taken by net from the Ewe, and carefully placed in the pool, on the 18th they showed a disposition to spawn, but on the 20th the whole were carried away by some ill-disposed persons, and on examining the pool, only a small quantity of ova appeared to have been deposited On the 23rd of November four pair of salmon were again caught and placed in the pool, which were observed to commence spawning on the day following,—caught them carefully,—squeezed gently about 1200 ova from a female into a basin of water, and then pressed about an equal quantity of milt from a male fish over them, stirred the two about gently, but well together, with the fingers, and after allowing them rest for an hour, the whole was deposited and spread in one of the wicker baskets recommended by Professor Agassiz, having about 4 inches of gravel below them and 2 or 3 inches of gravel above A similar quantity of ova, treated in the same way, was also deposited in one of the copper wire bags, as used by Mr Shaw, and both were then immediately placed under water in the pool, a little of the ova was buried in the open gravel at about 3 inches in depth In another basket, and also in another copper wire bag, 2 or 3 inches of gravel were placed over the bottom of each, and both basket and bag laid in the pool, covered with about 4 inches of water The ova of a female and milt of a male were then successively squeezed from two fish on the gravel in both basket and bag, and spread over it regularly with the hand one after the other, and after leaving them exposed, in this state, to the water for a few minutes, the whole was covered with 2 or 3 inches of gravel and left in the pool These four pair of fish afterwards emitted voluntarily a small quantity of spawn which had been left with them, and on the 1st of December they were all turned out into the river On the 3rd of December, caught three pair of salmon which had already partially spawned in the Ewe,—used another basket and also another wire bag, treating the spawn in the same manner as last described, these fish were then also allowed to deposit voluntarily the little spawn of which they had not been deprived, and afterwards turned out into the river On the 19th of February examined the ova, and life was plainly observed in the baskets, wire bags, and unprotected gravel, both where placed artificially and where deposited by the salmon themselves

19th of March, the fry had increased in size and went on gradually increasing, much in proportion to the temperature of the weather

22nd, the eyes were easily visible, and a few of the ova had burst, the young fry having a small, watery, bladder-like sac attached to the throat

18th of April, the baskets and bags were all opened, the sacs had become detached from their throats, the fry measured about three-quarters of an inch in length, and they swam about easily, all marked distinctly as Par The baskets recommended by Professor Agassiz proved superior to the wire bags of Mr Shaw In the latter only about 20 per cent came to maturity, whilst in the former not above 10 per cent proved barren, and in the baskets used 5th of December not above 5 per cent was unproductive It is impossible to say exactly the proportion of ova which came to life either of that artificially impregnated and deposited in the open gravel, or of what was spawned by the fish themselves naturally, but so far as could be judged, they succeeded equally well with that in the baskets Perhaps the baskets may have a preference over the other methods tried, as affording more certain protection to the spawn during winter, and it is proper to state, that the last-described mode of depositing the ova and milt was most successful There can be no doubt, from the success which has attended these experiments, that the breeding of salmon or other fish in large quantities is, comparatively speaking, easy, and that millions may be produced, protected from every danger, and turned out into their natural element at the proper age, which Mr Shaw has proved by repeated experiments on a small scale to be when they have attained about two years of age When the par marks disappear they assume the silvery scales of their parents, and distinctly show a strong inclination to escape from confinement and proceed downwards to the sea

Professor Agassiz asserts, and I fully believe with truth, that the ova of all fish, when properly impregnated, can be conveyed in water of a proper temperature even across the Atlantic, as safely as if it were naturally deposited by the parent fish, so that any quantity of salmon or other spawn can (after impregnation on the banks of a river) be carried to other streams, however distant, which may be favourable for hatching It may be right to observe, that as the fry are to remain two years in the artificial pools where hatched, fresh places must be used every second year for the spawn, as even one-year-old fry will destroy spawn, or their more infantile brethren, if left together, old spent salmon are also destructive both to spawn and fry

It can only be ascertained by experience what kind or quantity of food will be required for the fry Carrion hung at the top of the pool in which they are, would, in the opinion of Professor Agassiz and Mr Shaw, supply them with maggots, but in this there are difficulties, and when tried by me this season, a few of the fry were found dead round the carrion given to them The droppings of cattle allowed to rest till half dry, and occupied by worms and the ova of insects, appear to suit them best About the 1st of September last, when on an agricultural tour of Belgium, I visited an establishment belonging to King Leopold, and adjoining his new palace of Ardennes, on a much more expensive scale than that now described, where the breeding of trout had been tried for the three previous seasons, though with but little success A very few small trout bred 1839–40 were still alive, but the ova of 1841 were a complete failure, chiefly from not properly covering the spawn with gravel, and other errors Bread made of brown and white flour mixed was the food found best suited to the few living, who, judging from their shape as seen swimming about in a small pool, were in excellent condition The trout-breeding establishment of Ardennes, however, proves that their spawn, if treated in the same way as that of salmon above described, will produce the same successful results, and that any one possessing a convenient pond or stream may stock it with the best kinds of trout or other fish in one or two years, and by good feeding have them in high condition Where trout already exists of small size and inferior quality, I would recommend wholly destroying the breed by saturating the water with quick-lime or any other mode more advisable, and procuring spawn or fry from lakes where the best kinds of trout are found, in Scotland or elsewhere The same may be said of grayling, pike, or any other kind of fish suited to ponds or brooks and rivers as may be desired by their owners, which renders the discovery now made known of value to all, and in all quarters, as well as to salmon-fishing proprietors In conclusion, I hope that the above brief account may not only be well understood, but that the ease and comparatively trifling expense at which the breeding of fry can be accomplished may induce many this season to try this novel but successful mode of increasing our stocks of salmon and other fish, and consequently adding largely to the wealth of our country —F M

Should any further information be wanted, Sir F will gladly reply to such inquiries, and he now expresses a hope, that those who may be successful in spring 1842, or after years, will communicate to him any account of improvement on the mode of breeding, feeding, &c now described, as, though perfectly satisfied with the results of his own experiments, Sir F is ready to acknowledge that there exists nothing so perfect devised by man as not to admit of improvement

Conan House, Ross-shire, Oct 1st, 1841]

XXII —*On* Epilobium angustifolium, *and species which have been confounded with it* By Mr H O Stephens

To the Editors of the Annals and Magazine of Natural History

There appears to be two species of *Epilobium* confounded by British botanists with *E angustifolium*, Linn , one is probably indigenous, the other certainly so I shall endeavour to furnish discriminating characters

1st *Epilobium angustifolium*, Linn Leaves scattered, rather broadly lanceolate, veined, smooth, inflorescence subspicate, petals unequal, genitalia declined, stigma large, *club-shaped*, capsule *short, turgid* Species Plantar 493, Aiton, Hort Kew, tom ii p 4, Smith, Eng Flor, tom ii 212, Eng Bot, tab 1947, Hooker, ed iii 182, Lindley, 108 *E spicatum*, DeCandolle, Prodrom, pars iii p 40 *Lysimachia speciosa*, &c, Raii Synop, 310 *Chamænerion*, Ger Emac, p 477 fig 7

This is the common plant of the gardens, and is figured in 'English Botany' The leaves are of a very *dark green* colour, rather broadly lanceolate, distantly and faintly serrated, in general outline resembling those of *Salix alba* The upper part of the stem, towards the spike of flowers, very obscurely angular, flowers deep crimson, capsules *short and very turgid*

2nd *Epilobium macrocarpum* Leaves scattered, linear-lanceolate, veined, smooth, inflorescence subspicate, petals unequal, genitalia declined, *capsule very long, linear*

This plant is of a lighter and more elegant habit than the former, the flowers are of a paler shade, inclining to rose-colour, upper portion of the stem, towards the inflorescence, of a coral-red, and acutely angular Stigma much smaller than in *E angustifolium*, barely club-shaped, Leaves very *pale* green, narrow, lanceolate, distantly and faintly toothed, in general outline resembling those of *Salix viminalis* *Capsule very long, exceeding three inches in length*, quite *linear*, without the least turgescence

This plant differs from *Epilobium angustifolium*, Linn, in the leaves being narrow-lanceolate, of a very pale green, in the smaller stigma, paler flowers and more angular stem, but the specific difference consists in the very long linear capsule, totally unlike the short and turgid seed-vessel of *E angustifolium*, Linn Modern British botanists deny (unnecessarily, I think,) *E angustifolium* to be a native plant, it was considered as such by Gerarde and Ray, and as it abounds in Sweden in situations much like those in which it is found here, this strengthens the supposition of its nationality However this may be, there can be no doubt that the second species, *E macrocarpum*, is indigenous, it cannot have escaped from cultivation, because the plant so common in gardens is *E angustifolium*

Discovered by my friend Mr G K Thwaites in the lower portion of Leigh Wood, Somerset, in a coppice which had been cut two years ago, a situation very distant from any habitation

HENRY OXLEY STEPHENS

Bristol, 3 Terrill Street, Aug 26, 1841

XXIII —*A List of Flowering Plants found growing wild in Western Norfolk* By the Rev GEORGE MUNFORD*, Corresponding Member of the Botanical Society of London

THE tract of country embraced by the hundreds of Freebridge Lynn, Freebridge Marshland, Clackclose and Smithdon, and which forms the western side of the county of Norfolk, contains the remarkable district called Marshland—a part of the great level of the Fens, and the higher ground bordering on the Wash, which lies between the counties of Norfolk and Lincolnshire

From the extent and variety of this field, it will easily be seen that the botanist will find in it ample space for the exercise of his favourite pursuit

Local advantages, derived from a residence of almost twenty years in the principal and central town of the district, may be supposed to enable the compiler of the following list to correct, in some few instances, the errors into which others, not residing on the spot, may have fallen, and perhaps to point out here and there a new locality for some of the rarer plants growing in the neighbourhood

It is with this view that, with the kind assistance of two or three botanical friends also residing on the spot, the attempt has been made to give, as far as possible, a correct and perfect list of the plants that are found growing wild in Western Norfolk

As little more has been done than to collect into one place what was previously known, but scattered throughout several published works, it may appear that labour and pains have been unnecessarily expended, but the employment itself has served to fill up, and very agreeably to amuse, many a leisure hour, and will tend to refresh the memory when the power of searching for these favourite objects of pursuit in the place of their growth shall no longer exist

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* Read before the Botanical Society of London, 6th August, 1841

The English Flora contains about 1500 vascular and 2800 cellular plants 722 vasculars are here enumerated as growing wild in the district which forms the western side of the county of Norfolk The writer's acquaintance with the cellulars is too limited to admit of his attempting to give any account of them in this paper A catalogue of the plants growing in the neighbourhood of Yarmouth, on the opposite side of the county, has been published by Mr James Paget, in which are found 725 vasculars and 450 cellulars, and the Flora of Central Norfolk, by Mr R J Mann, is printed in the 'Magazine of Natural History,' New Series, vol iv No 44, and in the 7th vol of the 'Annals and Magazine of Natural History,' No 43, an addenda by S P Woodward, Esq These two lists contain together 708 vasculars and 121 cellulars They are confined to the neighbourhood of Norwich, and embrace but a small portion of what may be called *central* Norfolk, so that the greater part of the county may yet be considered as unbeaten ground

All the plants previously admitted into works of established authority as having been found wild in Western Norfolk are included in this list To all these, and to others which I have not myself seen growing, the authority on which they are introduced is given, while for every species and locality not thus marked the compiler is responsible

The arrangement made use of is that of Professor Lindley in his 'Synopsis of the British Flora,' as best agreeing with the advanced state of botanical science in England, and the nomenclature is for the most part that of Sir W J Hooker in his 'British Flora,' which is generally acknowledged to be the best authority in the present day for determining the plant intended

The geography of plants is of much interest to the botanist, and every attempt to promote the knowledge of this branch of the science is worthy of observation It is now universally admitted, that the geological character of every district exercises very great influence over its vegetation An attempt has therefore been made to mark, as nearly as possible, the substratum of soil on which the rarer plants in the following list are found Where the place of growth is not added, the plant may generally be considered as distributed throughout the district.

By a reference to Woodward's Geological Map of Norfolk, published in 1833, it will be seen that, proceeding eastward from Lynn, which is situated on the *alluvium,* we meet with a narrow strip of the *Kimmeridge clay and oolite* that runs in a direction north and south nearly the entire length of the district This is followed by a much wider portion of the *carstone,* running in the same direction, and parallel with this lies about the same quantity of *chalk marl* The indentations of the eastern side of the district extend into the *hard* and *medial chalk,* but embrace only a small portion of the latter towards the north

The annexed tabular view will show, as nearly as possible, the geological character of the several habitats in which the rarer plants are found G M

Lynn Regis, 1840

Alluvium	Kimmeridge Clay and Oolite	Carstone	Chalk Marl	Hard Chalk	MedialChalk
Babingley	Bawsey	Bilney	Ringstead	Barton-Bendish	Berwick
Burnham	Blackburgh	Congham	E Walton	Beechamwell	Bircham
Gaywood	Castle Rising	Crimplesham		Boughton	Brancaster
Hardwick	Denver	Dersingham		Caldecot	Docking
Heacham	Downham	Fincham		Castle Acre	Fring
Lynn	Fordham	Hilgay		Gayton	Stanhoe
N Lynn	Middleton	Hillington		Hunstanton	
S Lynn	Mintlyn	Ingoldisthorpe		Leziate	
W Lynn	Roydon	Pentney		Marham	
Outwell	N Runcton	Shouldham		Massingham	
Reffley	S Runcton	Stradsett		Narborough	
Runcton Holme	Stow	L Winch		Narford	
Setch	Thorpland.			Sedgeford	
Snettisham	Wallington			Shingham	
Terrington	Watlington				
Tilney	Wimbotsham				
Titchwell	Wormegay				
W Winch					
Woolferton					
N Wootton					
S Wootton					

Class I VASCULARES

Subclass I DICOTYLEDONES

Division I DICHLAMYDEÆ

Order RANUNCULACEÆ

Thalictrum minus, Ringstead, Marham, Shouldham, Burnham, Narborough not common

———— *flavum*, Setch, Barton-Bendish not common

Adonis autumnalis, by Denver Sluice, Mrs Plestow in Eng Bot No longer found perhaps it should be erased, as it was probably thrown out from a garden Miss Bell

Anemone nemorosa, Castle-Rising Wood abundant

Myosurus minimus Hardwick, Wimbotsham, Runcton-Holme, Boughton not common

Ranunculus Flammula, Castle-Rising Thorpland, Denver Wimbotsham, Barton Bendish, Fincham

Ranunculus β reptans, Barton-Bendish, Fincham Mr Dawson Turner

———— *Lingua*, N Runcton not common

———— *Ficaria, sceleratus, bulbosus, hirsutus, repens, acris*, very common

———— *arvensis*, N Lynn, Thorpland, Hardwick, Barton-Bendish, Beechamwell

———— *parviflorus*, Gt Bircham, Burnham, Rev K Trimmer

———— *hederaceus*, Hardwick, S Wootton, Denver not common

———— *aquatilis*, very common

Caltha palustris, very common

Helleborus viridis, plentiful in a plantation at Ingoldisthorpe Miss Bell

———— *fœtidus*; castle-hill, Castle-Acre

Aquilegia vulgaris, thicket behind the Red Mount, Lynn rare

Delphinium Consolida, W Winch, Docking, Barton-Bendish rare

BERBERIDEÆ

Berberis vulgaris, Narborough, Barton-Bendish rare

NYMPHÆACEÆ

Nymphæa alba, Lynn, E Walton, Shouldham common

Nuphar lutea, Lynn, E Walton, Shouldham common

PAPAVERACEÆ

Papaver hybridum, Barton-Bendish B G, Burnham, Miss Bell

——— *Argemone, dubium Rhœas*, common

——— *somniferum*, borders of Castle-Rising Wood

Glaucium luteum, Heacham beach

Chelidonium majus, Gaywood, Congham

FUMARIACEÆ

Corydalis claviculata, Woolferton Wood, Bawsey, Blackburgh

Fumaria officinalis, common

CRUCIFERÆ

Cheiranthus Cheiri, Grey Friar's Tower, Lynn not uncommon

Nasturtium officinale, plentiful

———— *sylvestre*, banks of the Ouse, Stow Bridge, Downham Miss Bell

terrestre, Middleton, Stow

———— *amphibium*, N Runcton

Barbarea vulgaris, very common

Arabis thaliana, Castle Rising, N Runcton

—— *hirsuta*, S Gates, Lynn, walls at Downham

Cardamine hirsuta, pratensis, very common

———— *amara*, Reffley Wood, Pentney not uncommon

Draba verna, very common

Cochlearia anglica, very common

———— *Armoracia*, Outwell, on the banks of the Wisbeach canal

Thlaspi arvense, S Wootton, Mr Wardall not common

Teesdalia nudicaulis, Castle-Rising, Wimbotsham, E Winch
Iberis amara, E Winch Mr G Cooper in N B G
Cakile maritima, abundant on Hunstanton beach
Hesperis matronalis, Castle Rising, E Winch, Ingoldisthorpe rare
Sisymbrium officinale, Sophia, very common
Alliaria officinalis, very common
Erysimum cheiranthoides, Hardwick Stow Wimbotsham, Runcton-Holme, Downham, Denver not uncommon
Coronopus Ruellii, very common
Capsella Bursa Pastoris very common
Lepidium latifolium, found at Magdalen a few years ago Miss Bell
——— *ruderale*, N Lynn, S Lynn
Isatis tinctoria, in a field at Barton-Bendish where it is never known to have been cultivated B G
Brassica Napus, Rapa, campestris, naturalized
Sinapis arvensis alba nigra, common
——— *tenuifolia*, walls by the gas-works, Lynn
Raphanis Raphanistrum, common

Violaceæ

Viola hirta Marham Mr Crowe in Eng Fl, Shingham Mr Dawson Turner
—— *odorata*, not uncommon
—— *palustris*, Rev W Allen found it at Lynn some years ago not now on that spot
—— *canina, tricolor*, common

Cistineæ

Helianthemum vulgare, Hunstanton, Grimstone, Barton-Bendish, Beechamwell

Droseraceæ

Drosera rotundifolia, Roydon Fen, Dersingham, Marham Fen
——— *longifolia*, Rising Heath, Dersingham, Barton-Bendish, Marham Fen
——— *anglica*, Barton-Bendish, Shouldham, Roydon, and Marham Fens

Frankeniaceæ

Frankenia lævis, salt-marshes, Titchwell, Rev K Trimmer rare

Polygaleæ

Polygala vulgaris, Hardwick common

Malvaceæ

Malva sylvestris, rotundifolia, common
—— *moschata* S Wootton, Mr Wardall very rare
Althæa officinalis, Tilney, Terrington, and throughout Marshland

Hypericineæ

Hypericum quadrangulum, Rising Wood, Mr Wardall
———— *perforatum*, N Runcton, Barton Bendish common
———— *dubium*, not unfrequent about Stow and Wimbotsham, Miss Bell in N B G

Hypericum humifusum, Rising Wimbotsham Wallington
——— *pulchrum*, Middleton Heacham, Mr Wardall
——— *elodes* bogs on Rising Heath Dersingham

CARYOPHYLLEÆ

Dianthus deltoides, Swaffham Heath near Barton Bendish B G
Saponaria officinalis, W Bilney Hillington not common
Silene anglica Runcton-Holme Miss Bell
—— *inflata* Grey Friars Tower Lynn common
—— *maritima*, Hunstanton Brancaster
—— *noctiflora* near Stow Miss Bell, Barton Bendish, Fincham Mr Dawson Turner
—— *Otites* between Swaffham and Narford by the old road side Mr Wardall Barton Bendish B G
Lychnis Flos Cuculi, dioica α red *β* white common
Agrostemma Githago common
Spergula arvensis, common
——— *nodosa*, Castle-Rising
Sagina procumbens apetala common
Mœnchia erecta Burnham Miss Bell
Arenaria peploides Hunstanton beach
——— *trinervis* Wallington N Runcton Miss Bell frequent
——— *serpyllifolia*, common
——— *tenuifolia* Barton-Bendish, B G
——— *rubra marina*, common
Cerastium aquaticum Stow Miss Bell, Barton-Bendish, by the Car Mr Dawson Turner
——— *vulgatum viscosum* common
——— *semidecandrum* walls at Stow Miss Bell
——— *arvense*, W Winch, Magdalen, Narford
Stellaria uliginosa, common
——— *media*, very common
——— *Holostea*, very common
——— *graminea*, common
——— *glauca*, S Wootton banks of the Ouse common

LINEÆ

Linum usitatissimum, Hunstanton Downham
—— *perenne* Wisbeach Fincham Barton-Bendish
—— *catharticum*, Barton-Bendish, Shouldham Hunstanton Wallington Stow
Radiola millegrana, Rising Heath, Runcton-Holme

ACERINEÆ

Acer Pseudo-platanus, not very common
—— *campestre* Reffley Wood, hedges very common

GERANIACEÆ

Geranium sylvaticum Leziate, Mr Crowe in B G
——— *robertianum molle pusillum*, very common
——— *pyrenaicum* E Winch and W Bilney, Mr Crowe in Eng Fl

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AND

MAGAZINE OF NATURAL HISTORY.

No. 64. NOVEMBER 1842.

XXIV.—*On the Life and Writings of J. P. E. Vaucher.*
By Alphonse DeCandolle*.

Geneva, a few months since, witnessed the decease of the eldest of her naturalists, the author of the 'Histoire Naturelle des Conferves,' a work ranking as a classic, and cited universally and long since as a model of accurate observations.

We have lost this venerable old man, whom age had not robbed of his physical power, nor of the energy of his deep convictions. We love to recall the rare qualities which distinguished him, that nobleness of soul, which a frankness, sometimes bordering on rusticity, rendered prominent, that simplicity of manners so becoming to the man of learning and the pastor, that cordiality, devoid of vulgarity but abounding in sincerity, that constancy, that disinterestedness in the affections, which rendered M. Vaucher the best of relatives and the best of friends.

His presence amongst us operated as a moral protection and a continual encouragement to study. In our eyes he was the last representative of the school of Charles Bonnet, who cast so great a lustre over our town. He, together with De Saussure and his contemporaries, founded that Society of Natural History and Physics, whose unpretending character and amenity of discussion drew together the Genevese *savans*. At once professor of theology and botanist, he was a connecting link between two of the faculties of our Academy, and became an example of that union of religion with science which so advantageously distinguishes our clergy.

M. Vaucher had taught historical theology for a long time, but his natural tendency was rather towards the religion of the heart, and towards a profound study of the works of creation. The recital of so much strife caused by unintelligible questions, of so many wars and persecutions brought about by theological dogmas, was likely to produce this effect upon an upright and enlightened man He loved to look upon natural history as a branch of his own theology, and to find therein a variety of proofs in support of his inmost convictions, which were doubly powerful because uncontested and devoid of sectarian rivalry and rancour His happiness consisted in observing in detail the wonders of nature, and in attributing, with more or less probability, a fixed design to every phænomenon of vegetable life The theory of final causes was his guide, and the constant object of his reflections, and his last work, the 'Physiological History of the Plants of Europe*,' is the development of this mode of considering botanical science

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* From the Bibl. Universelle de Genève for July 1841.

M Vaucher was employed during several years in preparing this work He published a small part of it in 1830†, but perceiving it to be formed upon too extended a plan, he remodelled and rearranged it with an almost youthful ardour After long years of intellectual labour and enjoyment, the work was at last printed in four large volumes On his deathbed he received them, blessed Heaven for the favour of this last satisfaction, and employed his feeble and declining strength in sending some copies to his friends and to that sovereign, his former pupil, from whom he had received flattering marks of kindness ‡

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* Histoire Physiologique des Plantes d'Europe, ou Exposition des Phenomenes qu'elles présentent dans les diverses périodes de leur developpement Paris, 1841, 4 vols 8vo —See 'Annals, vol ix p 50

† See Bibl Univ 1830 (Sciences et Arts), vol xlv p 379, and 1837, vol ii p 134

‡ The Prince of Carignano, now King of Sardinia, was brought up in M Vaucher's institution, at a time when Piedmont was a part of the French empire, and when there was little probability that the house of Savoy, especially the princes of the younger branch, could ever ascend the throne Then commenced a connexion ever devoted and disinterested on the part of the venerable tutor, ever affectionate on that of the king I cannot resist the pleasure of quoting the dedication of M Vaucher's work to Charles Albert, it enables us to comprehend the views by which the author was guided, it is moreover in a style altogether new

"Sire,—I now present to you, as a feeble mark of my profound respect and of my lively attachment, this work, the labour of a great portion of my life, and which you allowed me in past years to hope I might be permitted to inscribe to you

"It is wholly consecrated to the glory of the Creator, whose works have always appeared to me the more admirable the nearer they are considered, and it is designed to produce in those who read it a part of those impressions which they have so often made me experience It is the study and the meditation of these wonders, of which I as yet only know the outlines, which have embellished my last years, and which have inspired in me a desire, continually more ardent, of one day contemplating them at their source in the bosom of Sovereign Wisdom

"Deign, Sire, to receive with that touching goodness, of which you have

By the expression, "Physiological History of Plants," M Vaucher meant the detailed analysis of the phænomena of vegetable life, not of any one plant, regarded as similar in general respects to all others, but of a certain species in particular, or of a certain agglomeration of nearly allied species, forming the same section or the same genus He passes by the general and ordinary questions of physiology,—absorption by the roots, the ascension of the sap, evaporation by the leaves, the modification of the juices by the atmosphere, the formation of the organs by the nutritive juices, the mode of penetration of the pollen, &c &c He prefers studying each plant in detail in the intimate relations of the different organs and the functions of these organs He describes what we may call the habits of plants, by analogy with the habits of animals In this manner of considering the subject, M Vaucher thought he should be original, and should lay the essential foundations of an edifice as yet unerected In fact, the publication of a considerable work with this particular aim is quite a new thing in science, nevertheless we must not forget, and M Vaucher himself mentions this, that other naturalists, for example, Conrad Sprengel, Duhamel and Cassini, have published some partial observations of the same kind on fecundation, on the development of the ligneous species, and on the vital phænomena of certain families All complete monographs, all treatises on cultivation, speak of the succession of phænomena presented by certain plants The merit of M Vaucher consists in his desire to extend this kind of observation to an infinity of vegetables which have not yet been sufficiently studied

The following is the method followed by the author He enumerates the families and the genera in the order of the works of M DeCandolle, translates into French the botanic characters expressed in Latin in the 'Prodromus,' and, for the families not yet included in that work, consults the best authors on descriptive botany Having stated the characters founded on the presence, the situation, and form of the organs, he details his own observations in a physiological point of view These are sometimes facts relative to the disposition of the leaves in the buds, the varying direction of the peduncles or of the branches, and the development of bulbs and of suckers;

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already given me so many proofs, this last offering of a heart which has always tenderly loved you, and has entertained the highest hopes of you

"J P E Vaucher"

A few hours after the death of the author, an affectionate letter in the king's handwriting came from Turin announcing the receipt of the book, and also a portrait of the king sent by his orders sometimes too, and oftener, to the mode of the dispersion of the pollen, to the different and successive movements of the parts of the flower, and to the dissemination of the seeds Information of this kind is very precious, when accurate, inasmuch as thereby the descriptions of authors are rendered more complete, some of whom have unfortunately neglected this kind of facts, whilst others, describing from dried plants, have not suspected certain phænomena of the life of plants Without herbaria we should hardly have any idea of the 40,000 or 50,000 species which grow out of Europe, and which have never been cultivated, they could never have been referred to their genera and families, they could not have been compared in the most essential relations, since they live in distant countries or flower at different periods, but we must also add, without descriptions made from nature the very delicate organs would be ill understood, the different secretions, the mode of action of the pollen, the development of the ovules, the diversities of colour, of consistence, of perfume, which also have their value, would neither be remarked nor well comprehended Besides, very many persons have not the patience and skill necessary for dissecting fragments of dried plants under a magnifying glass I know experience proves that we attain nearly everything by this means, and that the advantage of immediately comparing the flowers and fruits which in nature succeed each other at long intervals, compensates for many difficulties, but we also know that dried plants are not very attractive, and that the study of living flowers possesses, on the contrary, a peculiar charm True botanists understand and love both these means of observation, and use both as opportunity or occasion serves, they also will compare the work of M Vaucher, made from living nature, with works of another kind, made in a great measure from herbaria The one will frequently form the completion (*complément*) of the others Science will not have been placed on new bases, but will have been enriched by new facts

One point to which M Vaucher often directs attention is the function which he attributes to the nectar in the fecundation of the flower He calls this liquid *humeur miellée, honeyed moisture*, and notwithstanding the extreme diversity of origin, which he carefully describes, he considers as one and the same agent the liquids which proceed from the torus in many plants, from the base of the petals in some others, from the tissue of the stamens in rarer cases, or from that of the stigma a little before the fall of the pollen "The principal," says he, "and indeed the only conclusion towards which all the facts explained in this work converge is this, that the honeyed moisture is the agent of fecundation, without the concurrence of which fecundation could not take place This humour ordinarily resides in the gland which supports the ovary, where it is often very visible, but sometimes it escapes our observation and we find it on the stigma, which it impregnates at the period of flowering, or on the torus, as in all the *Rosaceæ*, sometimes also it resides in the glands situated either at the base of the stamens, or on some parts of their surface, or in short in the stigma from whence it proceeds, in a word, there is no floral organ where it may not be met with and give signs of its existence* "

In this theory there are two assertions one long ago admitted, namely, that the viscous liquid of the surface of the stigma is necessary to fecundation, the other new, the demonstration of which will be asked for, viz that the nectar secreted in other parts of the flower, particularly on the torus, is an agent of the same kind as the viscosity of the stigma Until the present time the nectar produced by the torus and by the glands has been considered as an excretion, that is to say, as a substance produced to disembarrass the plant of the matters become useless in the series of vegetative functions Those who saw in this product a liquid subservient in some manner to fecundation, did not go so far as M Vaucher, they supposed at most, with Conrad Sprengel †, that the transportation of the pollen on to the stigma must be made by insects, and that the nectar, as well as the stains of lively colour of many corollas, served to attract into the flower these living agents of vegetable reproduction

The use of the nectar in fecundation may be demonstrated in various ways It has been sometimes attempted to suppress the secreting organs, but the conclusions thence deduced appear to me uncertain, and M Vaucher probably thought so too, for he has not made trial of this kind of experiment In fact, one of two things must happen, either fecundation takes place notwithstanding the mutilation, or it does not take place In the first case, it may always be feared that it has been produced by the honeyed moisture from the general surface of the torus, or of the floral organs, which no mutilation could hinder, and of which there are many examples in the ordinary course of vegetable life If, on the contrary, fecundation has not been effected, we may suspect that this is owing to the wounds being too deep, and to the extraction of the glands necessary rather to the life of the flower than to its fecundation In natural history, observation leads us further than experiment M Vaucher, wishing to prove the physiological function of the nectar, has relied on detailed studies of the progress and series of the phænomena of the inflorescence His conclusions are rather inductions than proofs Let us quote some of the phænomena of which he speaks According to him, it is from them collectively that a well established conviction results

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* Vol iv p 521

† Das entdeckte Geheimniss, &c

"Of the four petals of *Corydalis tuberosa*, the two exterior petals, placed one above the other, exactly close the flower, to which they serve as a calyx, their superior margins are free and reflexed, the two interior ones, lateral and applied exactly one against the other, inclose the anthers in a pouch or quadrangular hood (*capuchon*) and do not separate, although a narrow slit is left between them by which the air penetrates Fecundation takes place a considerable time before the development of the flower, the anthers lie upon the stigma, which is a vertical and fringed disc, entirely covered with the yellow fecundating dust, the nectary which grows from the torus is a greenish body, filled with a honeyed liquor which proceeds from a well-defined pore, and is diffused in the cavity of the superior petal, thence it insinuates itself by the slit which separates the two interior petals and penetrates to the anthers and the stigma, which it thoroughly moistens This humour is not designed to attract flies, since it is contained in a closed sac" The grains of pollen fall on the stigma and burst, in order that their elongated pollinic tubes may penetrate into the interior It seems, indeed, that the abundant humour described in this particular case must bring about the phænomenon of the rupture of the pollen, if the facts are precisely such as the author has indicated The advanced season has not enabled me to verify them

In another chapter he says, that "the anthers of the *Helleborus fœtidus* open outwardly and in such a way that their yellowish pollen falls into the melliferous tubes*, filled at this epoch with the honeyed moisture, and gradually as they [the anthers] are matured from the circumference towards the centre, they raise themselves one above the other, and thus convey their pollen to the stigma, which can hardly be fecundated except by the emanations of the nectaries the little nectariferous tubes are seen quite open, powdered with the granules which absorb the limpid humour" Here, I confess that the induction appears rather indirect If the grains of pollen fall to the bottom of the flower, on the torus, or into special cavities in certain plants, we can scarcely conclude that these same grains contribute to the fecundation Does not an immense quantity of pollinic grains fall upon the earth around trees? In what way do they contribute to the fecundation of the ovules? Scarcely does one in a million of these grains again pass from the ground by means of the wind or of insects upon the stigma of a plant of the same species The pollen is so abundant, that the loss of a considerable proportion of the grains does not hinder the species from being reproduced Thus the pollen which falls into the nectariferous tubes of *Helleborus fœtidus* is probably so much pollen lost, and the function of these secreting tubes has perhaps no connexion with the rupture of the grains which fall into the liquid Besides, M Vaucher adds, that it is not the same in *Helleborus viridis*, and that its nectariferous tubes always appear closed In short, the author might have been asked how the grains of pollen, bursting in the nectar of the tubes, could be transferred thence to the stigma The expression which he uses, "the stigmas can hardly be fecundated but by the *emanations* of the nectaries,"—does it indicate an action taking place at a distance, an *aura seminalis*, setting out from the nectariferous tubes where the grains of pollen are, and conducting something invisible to the stigmas? This would seem to be so, according to the words, but the idea of an *aura seminalis* is at the present day inadmissible We must suppose that this passage relative to the Hellebore, with others containing analogous expressions, were written by M Vaucher a long time before the modern discoveries of the pollinic tube and its penetration into the stigma It is the inevitable defect of so extended a work not to be on a level with science on all points An author cannot be continually varying his plan and expressions in order to follow the progress of discoveries M Vaucher quite admits, in several articles, the action of the pollinic tubes, but his book was under preparation during a period of fifteen to twenty years!

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* The bilobed and tubular petals, so remarkable in the tribe of Hellebores

Let us proceed in seeking for proofs or presumptions in favour of the supposed action of the nectar

"In the genus *Agrimonia* the stamens, to the number of fifteen, surround a small convex torus, which is velvety and nectariferous, the anthers have a very wide connective, and bear upon the margins two turgid cells, which open principally towards the summit, they are at first inclined on the bottom of the flower, but at the time of flowering they raise themselves up and spread, afterwards, when they have lost their pollen, their filaments fold themselves and form by their union a kind of grating, and we see the connective impregnate the pollen with the honeyed humour with which it is itself covered, and afterwards the honeyed humour spread itself over all the floral organs" I have in vain endeavoured to verify this last part of the description All that concerns the movements of the stamens of the *Agrimonia* appears very accurate, and, in the flowers which I have observed, pollen always fell on the stigmas in consequence of these movements, but I have not perceived any appearance of nectar Perhaps M Vaucher had discovered a moment when this liquid is produced, but in any case I doubt whether it can act upon the pollen and upon its transference

M Vaucher considered the genus *Lopezia* as one of those in which the action of the nectar in fecundation manifests itself with most elegance He thus describes the phænomenon "There is at the bending part of their two petals, at the place where the superior limb begins, a small spherical drop of honeyed moisture, and opposite to it the stamen, as well as the style, enveloped by a whitish and petiolated hood, which botanists consider as an abortive stamen At the moment when the bilocular and extrorse anther opens its cells in order to scatter its bluish and bright pollen, the hood throws itself down on the inferior lip by a very marked flexure, and the pollen abundantly covers the two melliferous drops which absorb it, afterwards the withered anther is detached from the filament, and the style, till then shapeless and as it were abortive, lengthens insensibly and is terminated by a pretty globose, feathery and papillose stigma, which receives the contents (*émanations*) of the pollen transmitted by the honeyed moisture, for it is impossible to suppose that the anther could scatter its pollen immediately on a stigma not at the time in existence, and whose style was situated at the side opposite to the opening of the anthers, fecundation is therefore, in this case, evidently effected by means of the honeyed moisture, for there is not in the cluster any neighbouring flower whose anther could fecundate our stigma Two little nectariferous drops may also be remarked at the base of the corolla, similar to those of the petals, and which equally conduce to the fecundation" In admitting that the series of phænomena takes place in *Lopezia* just as the author describes, we cannot help asking how the pollen, after falling into the honeyed moisture of the petals, sends *émanations* at a later period to the stigma What are these *émanations*? What transportation can take place of the drop containing the pollen to the stigma? Here, it must be confessed, is a gap in the observation or in the description Perhaps the sense of the passage will be explained by an attentive examination of nature, for our author was most honest, and did not write in order to propose enigmas for botanists

[To be continued]

XXV —On the Dotted Vessels of Ferns By J W GRIFFITH, M D, F L S

[With a Plate]

DURING the examination of the petioles of some of the British Ferns, I have several times been led to doubt whether the dotted tubes found in them* have really been referred to their proper situation in structural classifications, and it their real functions have been properly understood They are usually considered as forms of woody tissue

These tubes are situated in bundles at tolerably regular distances from the axis and from each other, surrounded by the cellular system of the petiole In the younger petioles they are mixed with spiral vessels, but these are rarely found in the older ones Their transverse section shows them to be cylindrical or elliptical, not angular nor solid (Pl V fig 1 *a*) They are usually of a yellowish brown colour, terminating in acute extremities, which become more obtuse as their age advances *In situ* their terminations overlap one another (fig 3 *a*) Their surfaces are studded with small elliptical markings or dots, not extending far across the tube, but arranged in parallel lines, these dots are rarely exactly opposite each other, so that the axis of any dot in one row rarely coincides with that of any other in the next They have no tubular nor rimmed margin On some of the torn edges projecting solid fibres may be seen leaving spaces between them corresponding to the dotted parts, and sometimes on their edges may be seen the fragments of the lacerated membrane filling up the dots, thus proving that these tubes are composed of two coats, one of united fibres, the other delicate and membranous In the older petioles the tubes are often continuous at their extremities, but in the younger they are not When these tubes are examined in the dried state the delicate membrane filling up the dot disappears, leaving a perfect foramen The dots are situated obliquely on the walls of the tubes, so that if the upper and under surfaces be brought into focus under the microscope immediately after one another, or the focus of the object-glass be made to correspond to the centre of the tube so as to have both surfaces indistinct but still perceptible at the same time, the dots cross one another, showing their arrangement to be spiral When they are stretched they do not break but uncoil (Pl. V fig 4 *a*), as if the tube were formed by a band of four or five spiral fibres united at the margins Their terminal points are situated on one side so as to make the end appear cut off obliquely Sometimes there appears a black line extending along their surface and separating the rows of dots (fig 4 *b*) These tubes always contain air, except during their earliest periods Tubes somewhat similar to these have been figured by Link* from ferns (*Aspidium*, *Polypodium*, &c †), but they differ from those I have described in having a beaded margin and the dots being opposite each other

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* *Pteris aquilina* shows them remarkably well

These tubes are not true ducts, inasmuch as they uncoil without breaking, and contain air, they cannot be considered as any form of woody tissue for the last-mentioned reason, as well as because the dots have a spiral arrangement They are not scalariform vessels, as their markings do not extend across the tube, nor are they angular They agree with spiral vessels in, 1 terminating in pointed extremities, 2 containing air, 3 being composed of a fibre or fibres and a membrane, 4 uncoiling elastically So that although not actually spiral vessels, in consequence of the edges of the fibres not being free but adherent, they are, I think, undoubtedly formed from them, and perform precisely the same physiological functions This brings us to the question of the transformation of spiral into dotted vessels, which has been so often and so unprofitably discussed, inasmuch as even at the present time the highest authorities differ I believe that all dotted tubes are not formed in the same way, thus, the reticulated tubes of flowering plants are formed on totally different principles from those of these ferns I will not tire my readers by discussing this question, as it has been so often done by the best anatomists and physiologists I will merely direct attention to the fact of the spiral vessels being found numerous in young petioles or stems, and being more rarely found, at least not in the same abundance, in the older ones, also to a beautiful microscopic object lately laid before the public by Mr Kippist ‡, I allude to the spiral cells (sp vessels) found upon the testa of the seeds of *Acanthodium*, *Ruellia*, &c When the surface of these seeds is examined by a lens of low power, it appears covered with whitish appressed hairs These when moistened separate from each other and resolve themselves into spiral vessels which shoot out in the most beautiful manner from the surface When they are minutely examined by a high power the spiral fibre is distinctly seen at that extremity farthest from the testa the fibre remains simple (fig 3 §), where (as in

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* Ausgewahlte anatomisch-botanische Abbildungen Berlin, 1841

† Not British species

‡ Transactions of the Linnæan Society, vol xix p 76

§ The figures here alluded to are those accompanying Mr Kippist's paper in the Linnæan Transactions

fig 2) the tube has been stretched, the fibre breaks up into rings, and at that part nearest the testa where the pressure is considerable, the fibres at first are simply approximated, nearer still to the testa we have union of the fibres, and the reticulated duct produced

August 9, 1842

DESCRIPTION OF THE PLATE

Plate V

Fig 1 Transverse section of a bundle of dotted tubes from *Pteris*, *a*, the circular or elliptical orifices

Fig 2 Dotted tube from the same, *a*, conical termination

Fig 3 The same, *a*, overlapping extremities

Fig 4 The same, showing how the extended tube uncoils without breaking, *b* the black line spoken of above

Fig 5 and 9 Show how the thicker portion when torn presents a ragged edge this preparation was dried, and the thinner membrane deficient

Fig 6 Early dotted tubes from *Aspidium Filix mas*

Fig 7 Transverse section of bundle of tubes from *Pteris* when the internal surface of the tube is brought into focus the transverse bars may be seen

Fig 8 and 9 Fibres withdrawn from the membrane in *Aspidium Filix mas*

XXVI —*The Birds of Ireland* By Wm Thompson, Esq, Vice-Pres Nat Hist Society of Belfast

[Continued from p 59]

No 13 *Hirundinidæ* (*continued*)

Common Swift, *Cypselus murarius*, Temm Although this bird is common in favourite localities, the species must be set down with reference to Ireland generally as but partially distributed Along the western range of the island it is rather scarce, and in some extensive districts is never to be met with

The swift is more regular as to the time of its appearance around Belfast than any of the genus *Hirundo* It may generally be seen during the first week of May, and frequently on the 2nd day of that month

In his ' Illustrations of British Ornithology ' Mr Selby observes, " It has been remarked that these birds delight in sultry weather, with approaching thunder-storms, at such times flying in small parties, with peculiar violence, and as they pass near steeples, towers, or corners of buildings, uttering loud screams which White, in his Natural History of Selborne ' supposes to be a sort of serenade to their respective families This is fanciful and pretty, but I should rather be inclined to reason the opposite way, and to consider this action and cry as the consequences of irritability excited by the highly electrical state of the atmosphere at such times " With Mr Selby I agree in considering the remark of White respecting the scream of the swift to be merely 'fanciful and pretty, as I have heard these birds scream in the manner described so soon after their arrival as to afford sufficient proof that the cry did not proceed from the " males serenading their sitting hens," as at the time incubation had not commenced* But I cannot coincide in opinion with Mr Selby that " this action and cry are the consequences of irritability excited by the highly electrical state of the atmosphere at such times " This idea differing from my own previous to the perusal of the admirable work in which it appeared, I, for two summers, gave some attention to the subject, to see how far my preconceived opinion was justified In the years 1832 and 1833, from the 7th and 9th of May, the days on which the swifts first came under my observation about Belfast, until the 1st and 3rd of June (when I left home) they daily in dull and gloomy as well as bright and cloudless weather kept flying about in small parties, screaming loudly

The following particular notices on this subject are abbreviated from my Journal —

May 24th, 1832 —For the last eight or ten days the swift's scream has been daily heard, and when present this evening at the closing sessional meeting of the Historic Debating Society, the swifts obtruded themselves on my attention by flying, " in small parties," closely past the windows, screaming most furiously Though amusing to the ornithologist, it must have been very annoying to the assembled company to be ' serenaded by their ill-timed scream, which not only jarred most discordantly with the " eloquent music' discoursed within, but for the time being entirely drowned the voices of the speakers, and indeed almost seemed to be intended as a mockery of what was passing there During these ten days the weather has been rather dark and cloudy, the barometer remarkably stationary, and very high With the exception of a few showers on one day, no rain has fallen

May 27th and June 3rd, 1832 —Weather remarkably fine and warm, sky almost cloudless The screaming of swifts heard above every other sound, about the localities frequented by them

May 22nd, 1833 —After eight this evening which was very warm and the sky cloudless, swifts were flying about in little parties of three and four, and noisy as usual two of these parties would occasionally join, and continue together for a short time screaming vociferously These evolutions have always seemed to me manifestations of pure enjoyment, and I have considered the swift's peculiar cry generally indicative of pleasure When these parties were about to meet, and when just separating, their power of screaming was exerted to the utmost* Similar evolutions, in which a much greater number of these birds participated, were witnessed on the 24th inst, the weather being similar to what it was on the 22nd, in regard to fineness and a cloudless sky The barometer was very high and stationary on both evenings The state of the barometer and weather has been mentioned that some idea may be formed whether or not the atmosphere could have been ' highly electrical ' throughout the varied weather described, or indeed daily throughout that of any two months in this climate†

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* I have often remarked what doubtless led White to conjecture that the cry of the swift is the serenade of the males to " their sitting hens," as, at the season of incubation, these birds (but of which sex I cannot say) may often be observed flying about in the neighbourhood of their nests, and screaming only " when they come close to the walls or eaves "

Swifts prefer to nestle in lofty edifices, especially when in a state of dilapidation‡ but in the north of Ireland, where these do not often occur, they content themselves with more humble dwellings I have remarked that in many of our northern towns§ where swifts are as plentiful as in any country, that they select for their domicile the eaves of the oldest houses or those from which the fast encroaching spirit of improvement has not yet banished the thatched roofs On the 8th of July 1833, I observed many of these birds flying under the eaves and clinging to the walls of occupied two story houses of this kind in the town of Antrim and although they and the martins appeared an indiscriminate multitude when flying about the street, their places of nidification were quite distinct the martins building on the south, and the swifts confining themselves to the north side on a house just opposite the chief abode of the latter, I reckoned about twenty nests of the martin When in the town of Ballymoney, on the same day several swifts were observed to fly under the thatch of a house similar to that described, whilst against it appeared some inhabited nests of the martin On the 24th of June 1834, the swift was remarked to have similar nestling-places in Lisburn and Banbridge In all the above-mentioned localities these birds were flying about in groups and screaming violently, the weather being delightfully warm, and the sky not only "purely beautifully blue but not a cloud visible For a week after the former date the weather continued very warm and dry

In Belfast, where houses such as those described are not to be met with, I have known the swift's nest to be placed under the windowsills of houses newly erected, to which the bird gained access by means of an aperture, about an inch in width, that the careless builder had neglected to close up An ornithological friend has seen swifts fly under the eaves of the low thatched cottages in the village of Magheralin (county Down), where they doubtless nestle

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* Mr Macgillivray remarks, "that the loudest and most frequent cries are heard when birds are evidently in active and successful pursuit" At the times above alluded to they certainly were not feeding

† Mr Macgillivray, in his 'British Birds, vol iii pp 619 and 622, enters fully into the subject of the swift's screaming His observations of 1837 very generally agree with mine, made a few years before Dr J D Marshall, in his memoir on the Statistics and Natural History of the island of Rathlin, where swifts are plentiful, states, that the result of his observations is opposed to the views of White and Selby He believes the loud screaming of these birds to be particularly induced by fine weather and an abundance of food

‡ When on Ram's Island, in Lough Neagh, in the month of June 1833, I remarked several of these birds flying in the vicinity of the ancient round tower, whose "rents of ruin" were most probably their temporary abiding place

§ Swifts especially delight in large open spaces in towns

This species, like the martin, frequents the basaltic precipices of the north coast of Ireland, from their southern extremity at the Cave hill near Belfast, to their northern termination above the sand hills of Magilligan, and, from their being ever present in these situations during their sojourn with us, they doubtless have their dwellings in their crevices*

In the fifth volume of the 'Mag of Nat Hist,' p 736 Mr Couch remarks, ' It is not long that swifts have frequented stations convenient for my observation At first they were about two pairs, but they have now increased to four or five and it is singular, that according to my observation there is always an odd bird ' A similar circumstance was, for the first time, remarked by me in the summer of 1829, when three swifts repaired to Wolfhill†, and took up their abode between the slates and window-frame of a loft not more than twenty feet in height Here, where a shot was not permitted to be fired and the odd bird could not have lost its partner by the fowling-

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* White of Selborne mentions swifts " breeding in the sides of a deep chalk-pit at Odiham " At the end of June 1835, I observed numbers of these birds about the high limestone cliffs which rise in picturesque beauty above the river Derwent, at Matlock in Derbyshire, where it was presumed that they nestled

† This locality situated about three miles from Belfast, is elevated 500 feet above the sea, and is a favourite haunt of the *Hirundinidæ* During the sojourn of the swift, this species, with the three others, may frequently be seen at one view, the swallow, martin and sand martin sweeping in company over the ponds, whilst the swift, though generally maintaining a superior altitude, occasionally breaks through their ranks, the whole of the species, on such occasions, and indeed at all times, exhibiting the most perfect amity The swift builds here under the eaves of an out-house, the rafters of which display the nest of the swallow beneath them, under an adjoining roof the " cradle" of the martin appears, and not more than a furlong distant is the burrow of the sand martin It is extremely interesting to the lover of nature thus to behold at a glance all the species of these attractive summer wanderers that regularly visit the British Islands, and where they do thus appear, there are generally some charming features of natural scenery

When at Kilrea in July 1839, where the banks of the river Bann are picturesquely wooded, and the expansive stream of water is impeded in its progress from Lough Neagh to the ocean by low and scattered rocks which rise here and there above it, and in a moment change the smooth mirror of its surface into a scene of active and " lusty life, ' such as delighteth the angler's heart, I observed the four species, and swifts, not less than a hundred in number, keeping almost on the same level with the others

In Malta, again, on the 17th of April 1841, the day very fine and warm, our four *Hirundinidæ* were in like manner observed flying low and in company wherever we walked about the island, and all the species in numbers similar to what they are in their most favoured haunts in the British Islands This is a fortnight earlier than the swift generally appears in the north of Ireland piece, the circumstance was considered as "passing strange ' During three months, the usual period of the swift s presence in this country, the three mature individuals only appeared The following year also an odd number of these birds was observed at Wolfhill, there being either five or seven It may be stated, that during these two summers the houses there had in regard to fallen plaster and the growth of lichens, mosses, &c , rather more of a picturesque appearance than is consistent with the most perfect order, and that in the autumn of 1830 they were all repaired and *roughcast*, the swifts' eyrie being most carefully protected from the hands of the renovator , but, notwithstanding this the species has never since tenanted the place

Swifts generally keep at such an altitude, that the vicinity of water is not enlivened by their presence as it is by that of some of the *Hirundines* yet they may occasionally be seen flying over Belfast Bay (particularly about the time of high-water), as well as skimming the surface of ponds and rivers Once only have I witnessed these birds keeping regularly at a lower elevation than swallows This was on the 3rd of July 1838 a beautiful sun bright day, when numbers of them appeared flying over Strangford Lough near Portaferry, at from twenty to forty yards above the surface of the sea while, in the stratum of air immediately above, swallows were abundant

Bewick remarks that swifts (vol i p 267, ed of 1821) "are said to avoid heat and for this reason pass the middle of the day in their holes [and that] in the morning and the evening they go out in quest of provision " Mr Macgillivray too observes that in dry and sunny weather [the swift] generally rests in the middle of the day " This has, I conceive, been assumed from the circumstance that swifts are not seen about their breeding haunts throughout the day, like the swallow and martin Instead however, of lying concealed at such times, they are ranging far abroad During our very warmest and brightest days I have commonly seen them sweeping in great numbers over the mountain heaths and around the summit of Divis* the highest mountain in our neighbourhood† and near to which they have not any nestling-places Towards evening they return from these comparatively distant flights, and are then seen about their accustomed haunts for some time previous to retiring for the night, having thus led persons to believe that the evening is one of their favourite times for stirring out Swifts may likewise be occasionally seen on wing about their nests throughout the very warmest days‡

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* 1575 feet above the sea

† When here on the 15th of May 1836 (a remarkably fine day) to witness the eclipse of the sun, I saw fully as many swifts as had ever appeared when the season was farther advanced

In like manner I remarked them on the 6th and 7th of May 1841, about the lofty mountain tops, and there only, in the island of Syra, one of the group of the Cyclades Captain Cook, in his ' Sketches in Spain, mentions a similar propensity of the alpine swift, in the following words " I have heard they were not uncommon in Catalonia, but I never met with them, probably from their habit of going to feed at vast heights and distances in the daytime, which prevents their being seen " (Vol ii p 276)

‡ An intelligent shooter and taxidermist states that two swifts' nests which

In the 'Natural History of Selborne' (Letter 21), White remarks of the swift, that " in the longest days it does not withdraw to rest till a quarter before nine in the evening, being the latest of all day birds " In Belfast it may be seen about midsummer at nine, and not rarely for some time after that hour, before which the three species of *Hirundo* have generally retired

The swift generally leaves Belfast about the 12th of August, but in 1840 I saw a number of them here on the 19th of that month and in 1832 on the 20th, in 1833 I remarked about twenty in company, in its vicinity, so late as the 30th These were pursuing their prey most leisurely at about thirty yards from the ground many swallows and martins occupying the space immediately beneath them and each, the *Cypselus* and *Hirundo*, occasionally breaking through the others' ranks The month of August was much colder than usual this year, but that circumstance could hardly have influenced the swift in remaining beyond its ordinary time of departure, as the first assemblage of swallows and martins constituting a vast multitude was congregated for migration at the same time and place, and on the same day they all departed On the 4th of September 1835, swifts were observed by a scientific friend about Dunluce Castle near the Giants' Causeway, and on the 17th of that month in the following year, three of these birds were seen by myself at Hillsborough (county Down), and many more of the *Hirundinidæ*, which appeared at some distance were believed to be of this species About the same place, many of the *Hir rustica* were congregated preparatory to their departure I have never witnessed any assembling together of swifts,* towards the time of their migration, like that of the swallow and martin During the period of their stay, they are, in favourite localities generally to be seen in some quantity

In the course of a tour made to the south and south-east of Europe, &c, in 1841, the swift was first met with at Malta on the 17th of April, when many appeared in company with the three common species of *Hirundo*—*H rustica, H urbica,* and *H riparia* None were seen during the passage of H M S Beacon from Malta to the Morea, when numbers of *H rustica* and *H urbica* alighted on the vessel On the 6th and 7th of May swifts were next met with, about the mountain tops in the island of Syra, when the weather was very fine and warm Towards the end of the month they were seen at Smyrna, and were abundant at Constantinople Early in June they were numerous about a rocky islet north-east of Port Nousa, in the island of Paros, and were breeding in the fissures of low marine cliffs At the end of this month they were plentiful in Trieste, and in July at Venice (remarkably so here), Verona, Milan, &c At

he *manually* examined in the summer of 1839 were placed on the wall top of a two-story thatched house, and were like a sparrow s nest in a similar situation, but contained fewer feathers—in the one nest were two eggs which had been long incubated, and were therefore the complement, or full number, and in the other were three young birds Swifts have for some years built at this house, inside of which the common swallow as regularly nestles

Constantinople only were *both* the *Cypselus murarius* and *C melba* seen

White of Selborne and Mr Macgillivray (Brit Birds), give very copious and highly interesting accounts of the swift, from personal observation

ALPINE SWIFT, *Cypselus alpinus*, Temm —By the ' Dublin Penny Journal ' of March 1833, my attention was called to a *rara avis* said to have been killed at Rathfarnham, and preserved in the fine collection of native birds belonging to Thomas W Warren, Esq of Dublin

On calling to see this bird, I found it to be the *Cypselus alpinus*, a species unrecorded as occurring in any part of Ireland the specimen recognised as the alpine swift by Mr Wm Sinclaire and communicated by him to Mr Selby as an addition to the British fauna, having been obtained off Cape Clear, at the distance of some miles from land Mr Warren s specimen is incorrectly stated in the ' Journal to have been captured in the month of February as, according to a note made by that gentleman when the circumstance occurred, the bird was sent to him from Rathfarnham, in the neighbourhood of Dublin, on the 14th of March, being then in a perfectly fresh state

Four individuals of this species have since been met with in England, as particularly noticed in the ' British Birds' of Yarrell and Macgillivray

The first place I met with the alpine swift was about ten miles to the north of Naples, on the 12th of August 1826 when a great number of them were observed associated together in flight, at a considerable altitude The evolutions of this species in the air are similar to those of the common swift, but independently of their superior size which at once distinguishes them from that bird the white colour of a portion of the under plumage, from which they have received the name of ' white-bellied swift,' is very conspicuous, even when the bird is at a considerable elevation

When on the Continent in 1841, this species was first seen by us on the 9th of April, when descending the Rhone from Lyons to Avignon About half way between these cities several appeared flying over the river, and a few were seen at all suitable places thence to Avignon On the morning of the 28th of April when entering the fine bay of Navarino, great numbers appeared careering high overhead, and in walking through the petty town of the same name later in the day, alpine swifts were flying very low over the streets and houses although the weather was delightfully warm and fine On my visiting the island of Sphacteria, the western boundary of the bay, on the 29th, these birds were very abundant The attraction here was a range of noble precipitous cliffs which rise direct from the sea at the western side of the island, and which were inhabited by them, just such a locality as would be tenanted by the common swift in the north of Ireland, where the basaltic precipices are resorted to The day was as fine and warm as our northern summers ever boast, yet on walking along the top of the cliffs, these birds swept about low and in numbers, occasionally within a few yards of my head. In general appearance and flight they are very similar to the common swift: they are very noisy, almost constantly uttering a loud twitter, besides which they occasionally give a *brief* scream nowise resembling the long drawn and shrill cry of the common species. Towards the end of May I saw a few alpine swifts at Constantinople, wheeling about the heights of Pera, and near the high tower of Galata, in which they probably nestle. In the month of June I met with this species at the island of Paros, and about the Acropolis at Athens. Throughout this tour the common swift was more frequently seen than the *C. alpinus*, and at one locality only did they both appear—this was at Constantinople, where the former species was abundant, and a few of the latter were observed. This seemed rather remarkable, as in no scene did I meet with the one species in which the other would not have appeared equally at home. The only difference in their habits which struck me was, that the alpine swift is more partial to cliffs than buildings, the common swift more partial to artificial structures than to rocks.

THE GOATSUCKER, *Caprimulgus Europæus*, Linn., is a regular summer visitant to favourite localities in all quarters of the island, and of rare but occasional appearance elsewhere.

In the neighbourhood of Belfast it very rarely appears. A venerable sporting friend, who has been shooting here regularly in the season for above sixty years, has not during that time met with a dozen of these birds, although there are several districts apparently well suited to them. In the wooded glen at the "Falls" one was seen by Mr. Wm. Sinclaire and myself some years ago. It was perching lengthwise (as the species is well known to do), instead of across the branch of a fine beech tree then displaying the tender and beautiful green of its young leaves. I am aware of four only having been killed within twelve miles of Belfast, in the last fifteen years. Of these the first was shot at Belvoir Park on the 28th of July 1827; the second, in the summer of 1835, in the district of Malone; the third, on the 25th of September in the same year, in Hillsborough Park; the fourth, on the 1st of June 1840, at Bangor Castle: the stomach of this last was filled with the remains of several individuals of *Geotrupes stercorarius*. In the Ards, county Down, the goatsucker has not unfrequently been observed, by George Mathews, Esq., at Springvale, and he informs me, that about Echlinville a few have been shot. It is a regular summer visitant to the Mourne mountains, more particularly in the vicinity of Tollymore Park*. The gamekeeper there informed me in 1836, that he had frequently found the nest of the goatsucker, and had never observed in any of them more than one egg. On the 28th of June 1838, he pointed out to me one of their nests: it was at the base of a young tree planted in the spring and which formed one of a young plantation on the mountain side The bird was consequently seen on the nest from some distance She did not leave it until we approached within seven or eight paces, and then flew but a short distance before alighting —there were two very young birds on the bare ground, and about the distance of a foot from where they then were, it was stated that the eggs had been incubated

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* In Templeton's 'Catalogue of Vertebrate Animals' (Mag. Nat. Hist. vol. i. new series), this bird is noticed as "rare about Belfast, but [not] uncommon at Mourne, county Down." The *not* before uncommon was omitted in the printing of the paper.

The goatsucker is noticed by J V Stewart Esq as common in the north of Donegal It is stated to be a regular vernal migrant to the county of Wicklow,—the " Vale of Ovoca, a name familiar to the lovers of the Irish Melodies, ' is said to be one of its favourite places of resort Mr R Davis, jun of Clonmel says that this species is not uncommon, and annually breeds in some heath clad mountains near that town Captain Walker of Belmont, near Wexford, informs me that the 'fern owl" is rather common there Mr G J Allman of Bandon, states that it is occasionally shot in that neighbourhood, but is not known to him as regularly frequenting any locality A young plantation of limited extent, on the high banks above the river Blackwater, near Youghal, was pointed out to me in July 1834 by Mr R Ball as annually resorted to by these birds In three specimens sent him from the locality, the ghost-moth (*Hepialus Humuli*) only was found, one stomach contained the remains of nine of these insects When visiting the Lakes of Killarney in company with Mr R Ball, in July 1834, we had the gratification of seeing three goatsuckers hawking about and very near to each other as we were passing from the upper to the lower lake, and near the highly picturesque mountain called the Eagle's Nest in the twilight, the white markings on the tail of one of them—said to denote the male bird—were quite conspicuous On the following evening we saw another between Innisfallen and Ross Island

Dr J L Drummond informs me, that when H M S San Juan (of which he was surgeon) was anchored near Gibraltar, a few goatsuckers flew on board, in the spring of the year During the passage of H M S Beacon, at the end of April 1841, as particularly noticed in 'Annals,' vol viii p 128, several goatsuckers were seen and some shot On the evening of the 1st of June two were killed, and others seen, in the barren and now uninhabited island of Delos, by some of my companions the officers of H M S Magpie

White, in his 'History of Selborne,' gives an extremely interesting account of the goatsucker Sir Wm Jardine very fully notes its various modes of flight and in Macgillivray's 'British Birds an ample description is given by the author, to which are added valuable contributions from Mr Harley and Mr Weir, the observations of the former having been made near Leicester, and the latter at Bathgate, Linlithgowshire

[To be continued]

XXVII —*Observations on the Common Toad, and on its long Abstinence from Food* By JOHN BROWN, Esq

IN repeating an experiment on the Common Toad as to its long abstinence from food when deprived of a free circulation of air, which was made three years ago (see vol iii p 518, 'Mag Nat Hist' N S), it will there be seen that the animal in that instance died three days after it was restored to light and air from its being, as was supposed at the time, most injudiciously exposed to the sun during that time in a southern aspect for the purpose of its being seen by any one who from motives of curiosity might wish to do so

After the death of this toad, the trial being thought not quite perfect, another was selected and placed in the same grave out of which the former one was taken, and after remaining in that situation for three years to the very day upon a bed of dry flinty gravel, and with full three feet in depth of gravel over it, and without any apparent means of obtaining food, the toad was removed from its dormitory alive, but its body and limbs were discovered to be wasted and shrunk in some measure This removal took place on Friday the 2nd of the present month (September) It was then put into a hole made in the ground about six inches deep and shaded from the sun, in this state it lived seven days, but it died on the eighth day after it was taken out of the ground

At the same time that the animal now under notice was buried alive, four other toads were put alive also under two flower-pots, two animals under each pot, with its mouth downwards, as in the former instance, to prevent the pressure of earth from crushing them

These were also buried three feet below the surface, in a corner of a field in a dry soil Here we met with a very different result, for after removing the earth and turning up the flower-pots, not a vestige could be seen of any part of the four animals that were put under them three years before, and although search was made, not in a careless manner, for any part of the bones, skin, &c, not a trace of any of them could be seen, every fragment of their skeletons had disappeared, and after searching the earth over which the pots covering the toads had been whelmed very cautiously, all that could be found in the soil belonging to the animal kingdom were the antennæ, legs, and the elytra of beetles

The only solution of the difficulty that then presented itself as to the cause of removal of the carcases of the toads, was that the larvæ of the beetles in question, or the insects in a more perfect state of existence, had effected their removal by devouring them

This is a question affecting entomology, and very probably among the numerous readers of this work, or the more scientific contributors to it, we may be favoured in a future number with a better solution of the matter in question than the foregoing

The animals under notice in both experiments, when first taken out of the ground, were quite exposed to the open air, in the first instance the toad was very improperly placed in the sun for the space of three days in a southern aspect, as was before observed, a situation never chosen by these reptiles during the warm season

In future experiments of this kind, perhaps if atmospheric air were to be admitted to the animals under the above circumstances in small quantities, and gradually, instead of sudden exposure to that element, we might then probably have a different result from those we have hitherto experienced, or after such long confinement as three years, letting them have access to their native element, water, for a time, this might be a means of recovering the animals and prolonging their existence, but this can only be ascertained by future research

Since writing the above I have perused an interesting article in vol vi p 459 in the 'Mag Nat Hist,' which is pertinent to the remark of letting the animals have access to water when taken out of the ground after long periods of imprisonment It is there stated that a toad was discovered 'in a solid piece of ironstone, which on exposure to air exhibited symptoms of animation, and being put into water lived about three weeks, growing to nearly double its size when first released from its confined cell, which was just large enough to contain its body"

It appears by the account above quoted, that this discovery was made by some miners at the Rough Hills colliery in Shropshire Vide *Shrewsbury Chronicle* for December 21st, 1823

Stanway, Sept 13, 1842

XXVIII —*On the varieties of* Dryas octopetala. By CHARLES C BABINGTON, M A, F L S, F G S, &c *

[With a Plate]

It is now several years since my attention was drawn to certain differences which exist in the specimens of *Dryas octopetala* obtained from two Irish stations and those found in England and Scotland, and I have at length determined to submit the following short account of them to the consideration of botanists To my valued friend, Mr J T Mackay, the credit is I believe due of having been the first to observe that a considerable difference existed between these plants, and it was by his kind permission that I had an opportunity of examining the growing plants in the College Botanical Garden at Dublin, and making from them the outlines which accompany this paper The differences which are found in the form of their leaves and calyces and in their pubescence, would in most genera be considered as of specific importance, but in the present case, although remaining constant in cultivation, they do not appear to indicate species Indeed I look upon this as an illustration of the well-known fact, that variations of the highest value as specific marks in one group only distinguish varieties in another It may however ultimately prove that these plants are really species, although that is not the view of them which I have been led to take

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* Read to the Botanical Society at Edinburgh, Feb 10, 1842

The characters to which I am now inviting attention are, the proportional length and form of the sepals, the form of the base of the calyx, the form of the leaves, and the pubescence of the petioles Combining these, I find three very well-marked varieties, two of them confined, I believe, to Ireland, and the third common in England, Scotland, and on the continent of Europe This latter being the best known form, I shall consider as the type of the species In it we find the sepals to be three or four times as long as broad and acute, the base of the calyx being hemispherical, in β the calyx is very nearly the same, being only less acute, but in γ the sepals are scarcely twice as long as broad and very blunt, and the base of the calyx is truncated in a remarkable manner In *a* and γ the leaves are ovate-oblong, and deeply cut into large rounded lobes, and the under side of their petioles and midribs clothed with long hairs, amongst which are numerous minute, linear, pellucid, fringed scales (Pl VII fig 1, *a*), in β the leaves are oblong or ovate-oblong, and deeply cut into large slightly acute lobes, and their petioles and midribs hairy, but without any scales

I would characterize the species and its varieties as follows —

Dryas octopetala (Linn) Leaves crenate-serrate, obtuse, flowers white

a Sepals three or four times as long as broad acute, covered with red hairs, base of the calyx hemispherical under side of the petiole bearing minute, linear, pellucid, hairy scales mixed with long hairs, leaves ovate-oblong, deeply cut into large rounded lobes, under side of the petiole and midrib green (Pl VII fig 1)

I have seen specimens of this variety from Teesdale, Breadalbane, Clova and Sutherland, also from Munich, Mount Stockhorn and the Col de Voza in Switzerland, the Pyrenees and Calabria

β pilosa Sepals three or four times as long as broad, slightly pointed, covered with nearly black hairs, base of the calyx hemispherical, petioles hairy, but without scales, leaves oblong or ovate-oblong, deeply cut into large slightly acute lobes, under side of the petiole and midrib dark red (Pl VII fig 2)

I have only seen cultivated specimens of this variety obtained from the county of Clare in Ireland

γ depressa Sepals twice as long as broad, blunt and rounded at the end covered with red hairs, base of the calyx truncate, nearly flat, under side of the petiole as in var *α*, leaves ovate, deeply cut into large rounded lobes, under side of the petiole and midrib green (Pl VII fig 3)

I have gathered this plant on Ben Bulben in the county of Sligo, Ireland, but have not seen specimens from any other place Not having obtained recent flowers, I am unable to state the colour of the petals, but suspect that they have a considerable tinge of yellow

Should the colour of the flowers of *var* γ prove to be different from that of the other plants, or the characters derived from the calyx remain constant (which I believe to be the case), I should feel myself justified in naming it as a species, and characterizing it as follows —

D depressa Sepals twice as long as broad, blunt and rounded at the end, base of the calyx truncate and nearly flat, leaves crenate-serrate obtuse (Fig 3)

The character of *D octopetala* would then stand as follows —

D octopetala (Linn) Sepals three or four times as long as broad, more or less pointed, base of the calyx hemispherical, leaves crenate-serrate, obtuse (Fig 1 and 2)

EXPLANATION OF THE PLATE*

PLATE VII *Fig* 1 *Dryas octopetala*, var *α*.
a One of the scales greatly magnified Those represented upon the petioles in fig 1 and fig 3 are considerably larger than they are found in nature, in order to make them visible
Fig 2 Var *β pilosa*
Fig 3 Var *γ depressa* or *Dryas depressa* (nova species)

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* The figures being only intended for the illustration of the subjects treated of in this paper, all pubescence to which it has no reference is omitted

XXIX —*A Century of new Genera and Species of* Orchidaceous *Plants* Characterized by Professor LINDLEY

Decade 1

1 EULOPHIA *filicaulis*, foliis , scapo gracillimo paniculato, bracteolis pedicellis multo brevioribus, sepalis petalisque linearibus obtusis labello oblongo apice trilobo basi in cornu brevi producto, laciniis lateralibus brevibus intermedia oblonga concava crispa intus lævi venis quibusdam paulo elevatis, anthera bicristata

Mexico Karwinski in herb reg Monac

A very slender graceful plant, with the flowering stem 1½ foot high

2 EULOPHIA *dilatata*, foliis , scapo stricto simplici bracteis acuminatissimis ovario brevioribus, sepalis lanceolatis acutis, petalis paulo obtusioribus et latioribus labello basi mutico biauriculato sursum dilatato obtuso venis 5 basin versus lamellatis

Mexico, Karwinski in herb reg Monac

Flowering scape more than 2 feet high Sepals about three quarters of an inch long

3 GOVENIA *pauciflora*, foliis binis oblongis acutis scapo paulo brevioribus, racemo 7—8-floro, bracteis lanceolatis membranaceis pedicellis brevioribus, sepalis oblongis acutis, petalis labelloque intus lævi ovato-lanceolatis, antheræ mucrone recurvo

Mexico near Jesus del Oro, Karwinski in herb reg Monac

A very remarkable species, with short oblong acute leaves, and a few-flowered scape not much longer than themselves The whole plant is little more than a foot high

4 ISOCHILUS *cernuum*, caulibus cæspitosis filiformibus erectis foliis teretibus obtusissimis, spatha terminali bivalvi, pedunculis elongatis floribus cernuis, sepalis ovatis petalisque linearibus obtusis labello concavo subtrilobo columnæ adnato apice carnoso acuto utrinque rotundato membranaceo, linea elevata in medio

Mexico, Karwinski

The habit of this plant is that of *Isochilus globosum*, but its stems are nearly 6 inches high and stout in proportion, and the flowers are half an inch long they seem to be yellow

5 SUTRINA (Nov gen Vandearum) Perianthium cylindraceum clausum Sepala coriacea, lateralia fere ad apicem usque connata basi subsaccata Petala membranacea, conformia Labellum liberum, unguiculatum, supra basin medio elevatum, oblongum, concavum, indivisum Columna basi teres, sursum dilatata, apice utrinque alis falcatis instructa, clinandrio antice bidentato. Anthera membranacea, semibilocularis, antice membrana lata circulari cristata Pollinia 2, pyriformia, solida, caudiculæ lineari in glandulam longissimam setaceam incumbenti affixa —Herba glabra epiphyta, pseudobulbosa, foliis solitariis coriaceis, spica multiflora pendula.

SUTRINA *bicolor* Pseudobulbi parvi ovati Folia 2—3 poll longa, ovalia, subsessilia Spica 3—4 poll longa Bracteæ breves squamæformes Flores 7 lin longi Sepala oblonga apiculata apice recurva, verosimiliter viridia Labellum apice rotundatum, crispum luteum

Peru, Matthews in herb Hooker

This very curious genus is probably related to *Macradenia*, but its habit and structure are in all respects very peculiar The gland resembles a long bristle or cobbler s awl, and projects beyond the column extending as far as its long falcate arms The anther which is globose where the pollen lies, is furnished in front with a broad circular crest

6 BOLBOPHYLLUM *Napelli*, pseudobulbis conicis, folio oblongo obtuso, scapo 1 bifloro folii longitudine apice ipso sub flore bibracteato, bracteis setaceis inæqualibus sepalis lateralibus dorsalibus galeatis ovatis acutis, petalis conformibus paulo minoribus labello lineari obtuso unguiculato, columna basi utrinque in dentem acuminatum producta

Brazil, Descourtilz, Miers

A very singular species with a solitary flower, white with violet stripes and about half an inch long In form it much resembles the flower of *Aconitum Napellus*, which suggested to M Descourtilz its specific name The lip is white with green veins

7 BOLBOPHYLLUM *tripetalum*, pseudobulbo tetragono, folio oblongo acuto racemo breviore, scapo 6—7-floro flexuoso erecto, bracteis ovatis scariosis ovario longioribus sepalis linearibus acutis patulis, petalis minimis squamæformibus, labello ciliato unguiculato apice oblongo obtuso basi ima utrinque auriculato, columna 4 dentata

Brazil, Descourtilz

A good figure of this exists among M Descourtilz's drawings It is related to *B saltatorium* like which its lip appears to be delicately and elastically articulated with column The sepals are pale yellow, three quarters of an inch long The lip is bright yellow with crimson spots It is stated by its discoverer to be scentless and to cover whole trunks of trees

8 BOLBOPHYLLUM *gladiatum*, pseudobulbo ovato tetragono, folio oblongo carinato spica longe pedunculata multo breviori, spica secunda multiflora, rachi subclavata, sepalis linearibus lateralibus connatis, petalis obovatis ciliatis limbatis labello unguiculato cordato in processum angustum gladiatum villosum elongato, columna 4-dentata

Brazil, Descourtilz

A most singular plant, the appearance of whose flowers is thus described by M Descourtilz —"The upper sepal is very long, very narrow, channeled at its base, acute at the point, lemon-coloured, as well as the two lateral, which are joined by their edges into one, two-toothed at the point From the position constantly assumed by the flower, these three sepals are placed right and left of the axis

The petals are short, spathulate touching at both base and point, leaving between them a heart-shaped space they are white edged with purple, and fringed with purple hairs on their outer edge, in the middle is a large heart-shaped violet spot. The lip is hinged with the column moveable, and consists of a channel with broad wings, white edged with purple, and of a very long process, shaped like a sword-blade hanging down brownish and velvety with hairs "

9 BOLBOPHYLLUM *exaltatum*, pseudobulbo tetragono folio oblongo obtuso paulo breviore, scapo vaginato stricto longissimo (pedali et ultra) vaginis obtusis supremis laxioribus, spica multiflora, bracteis ovatis concavis acutis herbaceis, sepalis ovatis acuminatis, petalis oblongis ciliatis, labello obovato obtuso pubescente lamina elevata in medio, columnæ dentibus supremis cirrhosis, anthera mucronata

Guayana Schomburgk

The leaf of this remarkable plant is not much more than an inch long, while the scape is more than a foot high The flowers are purple, and half concealed by the large permanent bracts

10 BOLBOPHYLLUM *bisetum*, pseudobulbis inverse pyriformibus, folio lanceolato basi angustato spica paulo longiore scapi filiformis erecti vaginis 3 distantibus laxis acutis, spica densa brevi nutante, sepalis alte carinatis lateralibus connatis semiorbicularibus dorsali oblongo minore, petalis spathulatis unguiculatis, labello convexo linguiformi villoso basi cordato, columnæ dentibus setaceis, bracteis 2 filiformibus sub flore

Khasyia Griffith

A very singular little plant, with flowers as large as a small pea and deeply keeled sepals Under each flower is a pair of long filiform bracts

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XXX —*Horæ Zoologicæ* By SIR W JARDINE, Bart, F R S E & F L S, &c

No V *Description of some Birds collected during the last expedition to the Niger*

WHEN in London during the month of July last, Mr Waterhouse, being aware that I was anxious to receive information regarding the family of the *Nectariniadæ*, kindly placed at my disposal for examination a small collection of birds procured by Dr Stanger during the last expedition to the Niger, and as all the productions of a country which has been so fatal to our countrymen in the prosecution of their philanthropic schemes must be of interest, and the collection moreover presents some specimens apparently undescribed, a short notice of them has been considered as having a claim to a place in our 'Horæ"

The entire collection contained only four species, three of which belong to the genus *Nectarinia* of Illiger; the fourth is the common green-banded cuckoo of Southern Africa.

Chrysococcyx auratus.—A single specimen only occurs, exhibiting an intermediate state of plumage. On the upper parts, although the metallic lustre of the feathers is present, nearly all the white markings of the adult bird are there of a pale orange-red; beneath, the chin, throat, and upper part of the breast are entirely of that colour, the centre of the feathers darker, while the remaining under parts are white, with the dark metallic barring of the adult, and slightly tinted with reddish.

Nectarinia cyanocephala, Shaw, 1812. (*C. chloronotus,* Swain.)—Three specimens of the male form part of the collection, not apparently differing from those obtained in other parts of Western Africa. In one the process of moulting has commenced, and shows that the dark steel-blue of the head and neck is exchanged after the breeding-season for the more sombre olive colour of the back, becoming paler on the throat and upper part of the breast.

Nectarinia Stangerii, Jard., 1842.—This bird, so far as we can ascertain, is an undescribed species, and we trust that those who are averse to the indiscriminate use of proper names as specific designations, will wave their dislike while we endeavour to place a record, alike upon an important expedition and the services of one on whom devolved the safe conduct of the party to its termination when almost worn out by disease.* This interesting species belongs to those with dark plumage, soft and velvet-like to the feel, and having a coronal and gular patch of imbricated shining feathers. *N. amethystina* and *fuliginosa* may be considered as allied to it, and represent the artificial group. The Niger bird, of which there is a single specimen apparently in complete breeding state, has the upper parts, cheeks and sides of the neck of a yellowish umber-brown, with bright reflections when looked at between the light; the under parts are dark umber brown, and when seen across in the same manner have the reflections purple; there are no coloured axillary tufts. The coronal patch extends from the bill to the line of the eyes, dark bluish green, varying in tint with the light, and terminating posteriorly in a narrow band of violet, the space between the eye and the rictus, with the chin, are intense black, from the base of each maxilla there is a short narrow stripe of bluish green, inside of which the throat and fore-part of the neck are bright yellowish green, terminated with a narrow band of steel-blue edged with scarlet This is produced by the last row of brilliant steel-blue feathers, having the naked tips of the plumules produced of a bright scarlet, forming a narrow fringe on each, and appearing like a thread of that colour bounding the brilliant gular patch Bill, legs and feet black Length 5 inches, of the bill to the forehead, $\frac{7}{10}$, of the wing to the end of the longest quill, $2\frac{7}{10}$

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* "From want of engineers we should have had to drop down the whole length of the river without steam, had not Dr. Stanger, the geologist, in the most spirited manner, after consulting Tredgold's work on Steam, and getting some little instruction from the convalescent engineer, undertaken to work the engine himself. The heat of the engine room affected the engineer so much as to throw him back in his convalescence and prevent him from rendering any further assistance; but Dr. Stanger took the vessel safely below Eboe without any thing going wrong with the machinery."—*Athenæum, Jan. 29, 1842. Letter of Capt. H. D. Trotter.*

N chloropygia, Jard, 1842 —One specimen only occurred in the collection from Mr Waterhouse, but we compared it with another in the possession of Dr Stanger at Manchester, which corresponded with it Its nearest connexion is with the *N chalybeia*, for which it was at first mistaken, and while it presents considerable variations, it may still remain a question how far local circumstances may influence varieties, and also whether the birds from that part of the African coast continue constant in the markings, &c which seem to separate our two birds The distinctions are, a less size, and less proportional length of the wings and tail, the want nearly of the blue collar, that being indicated by a deeper green, slightly tinted with blue, by the under parts and flanks being pale oil-green, whereas they are broccoli-brown in the other, and by the upper tail-coverts being of the same brilliant green with the head and back, and not *rich violet-blue*, as in the bird from Southern Africa We have not seen specimens of *N chalybeia* from the western coasts of Africa to compare with those from the Cape of Good Hope, but it is not impossible that the bird which served for the description of the one so named in the 'Birds of Western Africa' may have been that now before us, and the "greenish tinge" on the narrow blue collar, and the "tail-coverts banded with greenish blue," almost lead us to believe that this has been the case

In Le Vaillant's description of "Sucrier à plastron rouge" (*N Afra*, Linn), a bird inhabiting the forests of Auteniquoi is described as almost intermediate in colouring between *N Afra* and *chalybeia*, the crimson band being less in breadth, and having all the red feathers transversely marked with lines of a rich golden green By referring to the following description, it will be seen that this is in part the case with the species now before us

In the bird from the Niger, the upper parts, wings and tail excepted, are of a very rich emerald bronzed green, the wings and tail are brownish black, on the former the edges of the feathers being dull oil-green, the chin is deep velvet-black, shading into the neck and upper parts of the breast, which are similar in colour to the upper parts, and finish on the breast by a band of deep bluish green, this is succeeded by a crimson band nearly similar in extent to the same part in the *N chalybeia,* and having the tips of the feathers on the upper part of it narrowly edged with golden green, while the belly, flanks, vent and under tail-coverts are of a pale oil-green, the ample axillary tufts are rather paler in tint than in its ally The comparative dimensions of the Cape and Niger birds are—

	Cape	Niger
Entire length	$4\frac{6}{10}$	$4\frac{1}{10}$
Bill to forehead	$0\frac{7}{\frac{1}{4}10}$	$0\frac{7}{10}$
Wing to longest quill	$2\frac{3}{10}$	$1\frac{9}{10}$
Tail from extremity of upper coverts	$1\frac{1}{10}$	$0\frac{7}{10}$
Tarsus	$0\frac{6}{10}$	$0\frac{5}{\frac{1}{4}10}$

Since the preceding notes were sent to press, that party of the Niger expedition which remained with the view of again attempting the ascent of the river have returned to Britain, and we have been obliged by the attention of Mr Fraser, the naturalist, for the examination of some *Nectariniada* procured during his sojourn at Fernando Po, among which are eight specimens of the male of our *N chloropygia* All of them agree exactly, and maintain the distinctions of colouring and proportions which are pointed out above as separating this bird from *N chalybeia*

Three specimens of the female accompany them, and they exhibit even greater differences The plumage above is olive or yellowish oil-green (not broccoli-brown as in *N chalybeia*) underneath, the chin is yellowish white, the breast of a deeper shade tinted with olive, and the centre of the belly is nearly gamboge-yellow, shading to a paler tint on the sides, flanks and under tail-coverts The wings are umber-brown, having the feathers edged with yellowish oil-green, tail nearly black glossed with green, and having the two outer feathers tipped with grayish white The entire length, $4\frac{6}{10}$, bill to forehead, $\frac{7}{10\frac{1}{4}}$, wing to longest quill, $1\frac{9}{10}$ The short notes which Mr Fraser's other duties enabled him to collect are also interesting as giving us insight into its habits —" Very common in flocks of from twenty to fifty near the houses, the note short but sweet, perch on the long grass and branches of the small shrubs" A female was procured breeding the nest, made of grass, was pendent from the branches of a small bush, she alone was the architect, both carrying and weaving the materials, the male was not observed to assist in any way

October 6, 1842

XXXI —*Extracts from a Report on subjects connected with Afghanistan* By Dr GRIFFITH, F L S *

General Nature of Afghan Vegetation

BEFORE entering on a few brief notices of those vegetable productions which are not cultivated, but which administer to the wants of the people, it may be as well to premise a few popular remarks on the general nature of the Afghan vegetation No parallel can be drawn between the Afghan flora and that of India in any part, for even in the lower parts of the country, but very little elevated above the general level of our extreme N W provinces, the flora of Afghanistan is decidedly peculiar

The transition commences, as may be said, along the Sutleje on the Ferozepoor route it is gradual, on that of Shikarpore it is much more abrupt At Peshawur, which is in north latitude 34°, and about 1200 feet above the sea, it is tolerably mature, still there is an intermingling of Indian species, and this continues, gradually becoming less, until one ascends to Gundamuk

In Kutch Gundava the Indian forms are less frequent, indeed it may be said that by the Ferozepoor route the Indian species encroach on the Afghan territory, in Kutch Gundava the Afghan species encroach on the Indian territory

The Afghan transitionary forms are various *Boragineæ, Reseda, Chenopodiæ, Berthelletia, Farsetia, Medicago, Butomus, Peganum Harmala, Nerium Oleander, Alhagi Maurorum*? The Indian transitionary forms consist of *Calotropis procera*, certain *Amaranthaceæ* and *Chenopodiæ*, certain *Sacchareneous* and *Paniceous* grasses, *Acacia, Arabica* and *pudica, Prosopis spicigera* and *Dalbergia Sissoo*

To gain a just idea of the Afghan flora, we must compare it with that of the Levant, and perhaps with the greater part of the basin of the Mediterranean, with which it may be said to correspond in latitude With the general flora of Persia it may be regarded as continuous

Few things can be more striking or worthy of comprehensive investigation than this vast extent of the Mediterranean or Australo-European botanical province Dr Falconer told me, that he had ascertained it to prevail a long way to the northward and eastward of Afghanistan, and I have materials for showing that it characterizes the country on the N face of the Paropamisus, between Mumuna and Bamean, and from the mission of Meyendorff to Bokhara, to which my attention was directed by Sir A Burnes, it is evident that it equally characterizes Bokhara, and the country between it and Orenburgh

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* From the Journal of the Asiatic Society of Bengal No 36 New Series

On this subject I shall enter into details in the purely botanical part of my report, which I shall have the honour of submitting with the arranged collection

The striking features of the flora, as compared with India, are the scarcity, generally amounting to absolute want, of indigenous trees, a general poverty in variety of form, the general prevalence of forms characteristic of Southern Europe, the abundance of the large European families, such as cruciferous, umbelliferous, &c plants, and of those forms of *Compositæ* known to botanists as *Cynarocephalæ*, and of which thistles may be mentioned as familiar instances, the common occurrence of bulbous monocotyledonous plants, such as tulips, hyacinths, onions, &c, the nature of its grasses, and the scarcity of *Orchideæ* and Ferns, which may be said to exist only in Eastern Afghanistan

The number of aromatic plants, the prevalence of thorny species, and the very general occurrence of the flowering periods in the spring months, are also deserving of notice

From almost all the forms being what are called European, it follows that no transition in form occurs consequent on variation of elevation, similar to that which has been so much noticed by all travellers in the Himalayas and other high Indian ranges In this we are accustomed to associate height with the appearance of forms familiar to our earlier days In Afghanistan it is not so, and it is remarkable enough that even the summer floras of its lowest parts, which have as high a mean summer temperature perhaps as any in the world, are still characterized by a majority of European forms In high or in low, in hot or in cold situations throughout Afghanistan, forms characteristic of an European climate will be found to prevail The traveller may pluck roses, pinks, hyacinths, sea-lavenders, kochias, eryngos, catchflies, flags, &c at an elevation of 1000 feet, as well as of 10,000 feet It would perhaps be difficult to find many generic forms characteristic of altitude

Ordinary visitors would be likewise much struck with the circumstance, that a total change in the indigenous plants may exist, while there is little or none in those cultivated. Thus at Cabul where the winter is so severe, and where heavy snow lies for two or three months, and about which not an indigenous plant common to India perhaps is to be found, he will see Indian corn and rice cultivated with wheat and barley, rice perhaps forming the prevailing crop. We may see at Cabul the rice-fields bordered by poplars and willows, the aspen quivering over the nodding rice. This is easily accounted for: an approach to community of temperature may perhaps be found between the summer heat of Cabul and the winter and spring heats of the plains of India, which may explain the cultivation of wheat and barley. Between the summer heats of the two countries, there is likewise sufficient community to account for the cultivation of rice occurring in both in the summer.

Brief notices on useful Plants occurring wild.

The accompanying list will be found extremely meagre, but in the first place, the great bulk of the vegetation consists of the large European families, among which valuable products in the wild state are not extensively presented, and in the second, it is drawn up from memory chiefly, for even the casual overlooking of the herbarium, which is requisite to make it more complete, would delay one considerably in the forwarding of the report, and I may add, there is no probability of valuable information turning up to compensate for this.

Among monocotyledonous plants, that of the most use is, I think, the *mazurrye* of the Khyburs and Momunds. It is a small palm, and appears to be a *Chamærops*, perhaps the same as *C. humilis* of Southern Europe. Should it be distinct, I hope it may be allowed to bear the name of *C. Ritchiana*, after Dr Ritchie, the only person who has explored the botanical productions of the Khybur Pass. This plant is extensively used in the manufacture of ropes or strings for the bottoms of charpaiees and of the sandals, so universally worn in the Momund and Khybur districts, and perhaps generally throughout lower Eastern Afghanistan.

Salep is to be found in the markets of Cabul, at a much lower price than in those of the N. W. of India. A species of *Orchis* is common in marshy places, high up among the Huzarah mountains, but I could not ascertain whether it was from this that Cabul [illegible] supplied. There is also an *Eulophia* in sand-islands of the Koonur river, from which salep may be derived.

Among the dicotyledonous plants, the umbelliferous family holds perhaps the highest rank, as affording valuable wild products In Afghanistan, most of the fœtid, or aromatic fœtid gum resins, such as opoponax, assafœtida, ammoniacum, sagapenum, will probably be found Of these the most important is the assafœtida, as it is largely exported, and consumed in the country as an adjunct to cookery It was first announced as existing in the country, I believe, by Sir A Burnes, it appears to be of general occurrence on the hilly tracts Probably it is furnished by two species At Metah, Capt E Conolly told me it was produced largely in the hot country of Seistan He also informed me, that it was collected in conical pieces of paper, placed over a complete section of the plant, at the junction of stem and root

As famous a plant as the assafœtida exists in the *Prangos pabularia* In Afghanistan, however, it certainly does not merit the reputation which Mr Moorcroft has recorded it possesses in some parts of Thibet This plant is not uncommon on the Huzarah mountains, at an elevation of 9500 and 11,500 feet, but it is not used more, either as summer or winter fodder, than most of the plants possessed of any degree of succulence of the same districts It is, as I have said, cut indiscriminately with thistles, docks, and a host of others, which would surprise an English farmer, this agrees generally with Dr Falconer's experience

The Mummunna, a Rhamneous genus, is held in some esteem for its fruit, which for an uncultivated one is by no means unpleasant It is common throughout the lower parts of Eastern Afghanistan, the fruit is a black berry of the size of a black currant, and of sweetish flavour A much more esteemed fruit, which is sold commonly in the bazaars, is the *Googoora Edgeworthia buxifolia*, Fal this plant was first found by Dr Falconer about Peshawur, and by him was named after Mr Edgeworth, a distinguished member of the Bengal Civil Service Its natural characters are, as it were, intermediate between *Myrsineæ* and *Theophrasteæ*, tending likewise towards *Sapoteæ* The fruit is roundish and succulent, about the size of a small marble, it is principally occupied by the seed, which is not eatable I have not seen it fresh It is considered heating by the Afghans, and this perhaps is the reason of its being common in the bazaars The plant is generally a thorny shrub it is common throughout the lower parts of the hills of Eastern Afghanistan

The Sinjit, which is probably the *Elæagnus orientalis*, ought perhaps to have been enumerated among the cultivated fruit-trees, it is commonly planted along the banks of water-cuts, and is ornamental from its graceful crown and gray foliage

The dried pulp of the berry is eaten, but it is much too sour for European taste

The *Pistacia* occurs, Lieut Sturt tells me, on the Hindoo Koosh, to a considerable extent, scattered plants of it are not uncommon throughout the mountainous parts of the country generally It is a low tree, the seed constitutes the fruit, and is as much esteemed by the Afghans as almonds are by us

Edible seeds, of a very pleasant flavour, slightly tinged with turpentine, are yielded by the *Chilghozeh*, a species of Pine, the seeds are, to all outward appearance, exactly like those of the Kunawur *Pinus Gerardiana* They are eaten in considerable quantities, the supplies being derived from the Sofaid Koh

Another wild fruit is yielded by the Umlook, a species of *Diospyros*, it also occurs in some gardens it is not worthy of any notice

One of the most celebrated plants in the country for its aromatic and stimulant properties is the Schnee, which may perhaps be a species of *Balsamodendron* It occurs in the Kojuck range, and is to be met with, though not to such an extent, on most others

Another famous plant is the Rhuwath, or Rhubarb, which as it is also cultivated and in great request, ought to have been arranged with the vegetables It is the only instance which evinces the knowledge of the Afghans of the value of etiolating or blanching certain plants I have never seen it, not having been in Cabul in the spring The wild plant, which I believe is the original of the cultivated one, is plentiful on the Kojuck range, and also on the Huzarah mountains up to an elevation of 11,500 feet The leaves of this are used with others as winter fodder the cultivated Rhubarb might easily be introduced into Simlah, Mussoorie and Darjeeling

Several of the wild plants of Afghanistan are extensively used as fuel Those in most common use about Cabul are species of *Artemisia* or wormwood, by some of our officers known as wild thyme, they are aromatic, camphorated, low shrubs, and some are eaten by camels In the loftier districts great part of the vegetable fuel is furnished by the plants known generally by the name of Koollah-i-Huzarah, Huzarah's Cap They form one of the most prominent features of the flora, occurring in dense, highly thorny, hemispherical tufts, as unpleasant to touch as the back of a hedgehog Many species occur To botanists they are known by the name of *Statice*

Plants eaten by camels become, in such a barren country as

Afghanistan, invested with a good deal of importance. Generally such are not deficient but one of the difficulties of the Bolan Pass is occasioned by their absence, and to a similar cause I attribute the great loss of camels on the return to India between Bookhak and Bala Bagh. Of these the most esteemed is the Ka-ri-Shootur, or Jawasa of the N. W., one of the most widely distributed plants occurring all over the N. W. of India, and all over Afghanistan, up to an elevation of 9500 feet. This plant is also known as affording the Turunjubeen, a sort of manna-like substance, the production of this appears to be local, and the only place I was told it was procured in Afghanistan was the Candahar district.

Perhaps the best other kinds of camel fodder are furnished by the *Chenopodeæ* or Goose foot tribe, these abound throughout the country, and are succulent and saline.

There is every probability of the true Tragacanth plants being found in the country, the section being one of the most common forms of *Leguminosæ*.

A species of *Daphne* not unlike *D. Cannabina*, the paper-plant of Nepal and Bootan is not uncommon at elevations of 5000 to 6500 feet. The Afghans only make use of it in the construction of the matches for their match-locks.

Of the timber-trees of Eastern Afghanistan an extensive use is not made, the Baloot suffers most from being most accessible. The Zaitoon wood is remarkably heavy, sinking in water it has a very close grain, and may be found to possess valuable properties. On the subject of forest-trees I have entered elsewhere.

Since the above has been in type, we have received from our friend the Rev. M. J. Berkeley the following interesting extract from a letter of Dr W. Griffith to Nees v. Esenbeck.

"Serampore, Oct. 11. 1811.

"I returned some months since from the country west of the Indus, whither I had accompanied the army during its campaign, and where I have been employed as naturalist a year after its departure. I have brought with me from 1700 to 1800 species of plants, besides a considerable collection of mammalia, birds, and fishes, of which the latter are now in course of being prepared for the Directors of the East India Company.

"The natural productions of Afghanistan are very different from those of British India, and approach much more nearly to those of the Levant, or more especially of those countries which form the basin of the Mediterranean With exception of the boundary line, which may be considered as identical with the course of the Indus, a mixture of forms occurs nowhere *Gramineæ*, *Smilacinæ*, *Labiatæ*, *Boragineæ*, *Synantheræ*, *Leguminosæ*, *Cruciferæ*, *Chenopodiaceæ*, are the prevailing families, as well in number of species as individuals Beginning from the Monocotyledons I have numbered my collection to the *Labiatæ* inclusive, and find so far 510 species, of which 250 are *Glumaceæ*, which is certainly a very high proportion The great number of *Staticeæ*, most of which are very thorny, is another peculiarity of this flora

"I intend on my return to England, which I expect will be certainly in two or three years, to publish not only these but the results of my other missions, and I should be glad if you would make known my intention on the continent

"I feel confident that botanists will place me in a condition to work up, in accordance with the prospectus sent to you some months since, the materials which I have made such exertions to collect, and I hope that I shall bring to England matter for the work, not inferior even to that which, according to the latest information, has been amassed for the flora of Brazil I shall with pleasure place at the disposal of those botanists who are engaged on monographs, or willing to undertake them, the whole of such parts of my collection as may be requisite, every notification however before my return must be necessarily imperfect, as the geographical relations of each species are known only to myself, and must be regarded as premature

"I have just finished an essay on *Santalum*, *Osyris* and *Loranthus* As regards *Santalum* there is much additional matter *Osyris* is extremely remarkable it has an embryo-sac analogous to that of *Santalum*, but the albumen and the embryo are formed exterior to it, and it enters not further into the composition of the seed In *Loranthus* the embryo seems to me to be formed from the end of the pollen-tube, altogether without the intervention of an embryonic nucleus (Eychens)

"All my observations confirm the views of Schleiden, with the exception of the inversion of the embryo-sac by the pollen-tube, and *Loranthus* very especially favours his doctrine

"I set out shortly for Malacca and remain there till my return to Europe This is a new and rich field, and the climate is excellent"—*Linnæa*, vol xvi p 286

XXXII —*Observations on the* Rodentia By G R Waterhouse, Esq , Curator to the Zoological Society of London

[Continued from vol viii p 84]

Considerable time has elapsed since I commenced the publication of my classification of the *Rodentia*, the groundwork of which was derived chiefly from the characters furnished by the skulls, and during the somewhat long intervals which elapsed between the appearance of the separate parts of the paper, I am happy to find that several mammalogists have devoted their attention to the group, and more especially Prof A Wagner, who has published a classification of the order in the first part of Wiegmann's 'Archiv fur Naturgeschichte' for 1841[*]

Prof Wagner objects to my classification because all the families are not reduced to their proper limits, and because some have been discarded by me which require to be re-established, had I however completed my paper, and certain families had then been left uncharacterized, part of this objection would have had more force

The first family (*Pedimana*), according to Prof Wagner's classification, I should not have attempted to characterize, because the single animal upon which the family is founded I have always regarded as a member of a different order—I allude to the *Cheiromys Madagascariensis*

The second family (*Sciurina*), the third (*Myoxina*), and the fourth and fifth families (*Macropoda* and *Chinchillina*) agree perfectly with four families characterized by myself Again, as regards our views of the contents of the family *Murina*, I find no essential difference Prof Wagner places in this family a few genera with the characters of which I was not sufficiently acquainted, and for that reason I omitted to introduce them

Beyond the several families above mentioned, and the *Bathyergidæ*, none have yet been characterized in my paper

The remaining families, according to Prof Wagner's classification, are, *Psammoryctina*, *Cunicularia*, *Castorina*, *Hystricina*, *Subungulata*, and *Duplicidentata* The genera *Lepus* and *Lagomys*, which constitute the last-mentioned family, afford such strongly marked characters, that in my tabular view of the geographical distribution and classification of the Rodents[†], I was induced not only to form a family under the name *Leporida*, for their reception, but to regard them as constituting a section of higher value

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[*] See also Annals, vol viii p 50 —Ed

[†] Published in the Proceedings of the Zoological Society for Nov 1839

The *Psammoryctina* of Prof Wagner I have long regarded as a natural group, and the genera of which it is composed were originally thrown together in the table before alluded to The principal characters which induced me to remove those genera from other groups in which they had previously been placed, are pointed out in the introductory observations to my paper on the Rodents published in the 'Magazine of Natural History' for February 1839

In the table published in the 'Proceedings,' however, there are two genera which are placed in juxtaposition with the others composing Prof Wagner's family *Psammoryctina*, and which that author does not include in the family, I allude to the genera *Dasyprocta* and *Cœlogenys*, on these I shall have to make some observations hereafter, as well as upon the little section of the family last mentioned, to which I gave the name *Octodontidæ* in the 'Zoology of the Voyage of the Beagle'

The tenth family of Prof Wagner's classification, the *Hystricina*, I have with most other naturalists regarded as a natural group, and have restricted to the same limits in the *table*

The remaining three families, according to the distribution of the Rodents under consideration, are, *Cunicularia*, *Castorina* and *Subungulata*, under these three heads Prof Wagner has grouped together various genera, as it appears to me, in an unnatural manner

Before however I proceed to the consideration of this portion of the subject, which is the chief object of these observations, I may perhaps be permitted to take a short review of my arrangement of the order

At the head of the Rodents are placed the Squirrels (*Sciuridæ*), which have the largest cranial cavity, the smallest development of the facial bones, and the most perfect palate, the sphenoids are broad and well-developed, and the posterior openings for the transmission of nerves from the brain are proportionately small

In the highest mammals (*Quadrumana*) it is that we find the most perfect bony orbit for the eye, and it is in the *Sciuridæ* among Rodents that we find the orbit also most perfect In their frugivorous diet and arboreal habits they may also be compared to the *Quadrumana* In their dentition, moreover, the present animals evince a superiority over their congeners

The extremities of the Squirrels are fitted for climbing and running, and their clavicles are well-developed They differ from nearly all other Rodents in wanting a character which is observable only in this order,—I allude to an ant-orbital opening for the transmission of a portion of the masseter muscle

The small opening in the superior maxillary bone of the *Sciuridæ* forms only a passage for the infra-orbital nerve, which in most other Rodents passes through together with the portion of the masseter muscle before alluded to In the Hystricine section of Rodents (the *Hystricidæ*, *Echimyidæ*, *Caviidæ*, &c &c) the ant-orbital opening is very large, whilst in the Murine group it is moderate or small, opens obliquely upwards, and is almost separated from the opening for the nerve, which passes through a narrow slit situated below the opening for the muscle, though joining it here we have a condition which is intermediate between the structure observable in the *Sciuridæ* and the Hystricine section

It is in the Murine group that we find a tendency to carnivorous habits, and it is in the groups of Rodents following the *Murina* that we find the most truly herbivorous species, accompanied often by an inferiority of powers in the extremities In fact, we find the most ruminant-like Rodents in the Hystricine section, the most carnivorous species in the *Muridæ*, and the most monkey-like in the *Sciuridæ* Thus, in the *Rodentia* we find analogues as it were, or representatives of other great divisions of mammals*

The *Leporidæ* afford the greatest contrast to the *Sciuridæ* observable here the portion of the skull devoted to the protection of the brain is very small and the facial portion large, the palate is most imperfect and leaves exposed the sphenoids, the bodies of which, instead of being large and expanded as in the Squirrels, are remarkably contracted, and the openings for the transmission of the nerves are large In the large orbits, separated but by a narrow bony septum, the large and united optic openings, imperfect palate, and narrow bodies of the sphenoids, we are strongly reminded of the bird's skull

In the *Caviidæ* and *Chinchillidæ* we find the nearest approach to the structure of skull and dentition observable in the *Leporidæ*, there is nevertheless much difference, this present family is in fact the most isolated among the Rodents

As regards the families, defined in the 'Magazine of Natural History' and in the 'Annals,' it appears to me that there are some which are open to objection I cannot feel a doubt but that the several genera associated under the heads *Sciuridæ* and *Muridæ* are naturally grouped On the other hand, I think upon more mature consideration that the group *Arvicolidæ* requires revision In the first place, I do not consider it as a group of equal value with the *Sciuridæ* or *Muridæ** The genera *Ondatra, Arvicola* and *Lemmus* of authors are undoubtedly most closely allied, indeed the first and last of these so-called genera might perhaps, without impropriety, be regarded as subgenera or sections of the genus *Arvicola* The animals composing these groups have all the essential characters of the *Muridæ*, but differ in having rootless molars and in the form of the lower jaw They have, moreover some peculiarities in the structure of the cranium, which have been pointed out

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* A similar system of representation is frequently observable in natural groups It is so strongly marked in the *Marsupialia*, that it has given rise to the belief with some naturalists that that is not a natural group, but is made up of members of other orders I regard it as an error of the same kind which has led to the separation of the Sloths from the *Edentata*, and the grouping of those animals with or near to the *Quadrumana*, and the separation from the last mentioned group of the *Galeopitheci* and the *Cheiromys*—placing the former with the *Cheiroptera*, and the latter with the Rodents

Here all the characters alluded to are combined, with three true molars, the normal number in the *Muridæ*, and may be conveniently used to define the *Arvicolina* as a subfamily of that group In my paper on the *Arvicolidæ* I had placed in that section, besides the three genera above mentioned, two others, *Ascomys* and *Castor* These genera M Gervais is of opinion should be arranged,—the former next the *Sciuridæ*, and the latter *in* that family According to Prof Wagner, the genus *Castor* is associated with *Myopotamus* under the family title *Castorina*, and the genus *Ascomys* forms part of his family *Cuniculariа*,—a family which, in my opinion, is made up of various groups of Rodents they all burrow in the ground, and being fitted for that habit, they have a certain superficial resemblance, as is also the case with the *Myopotamus* and the Beaver, both being aquatic animals† With M Gervais' views I am more inclined to agree the two genera under consideration are undoubtedly members of the great Murine section, and certain points of resemblance in the form of the skull and lower jaw induced me to place them in the Arvicoline group In the bony palate of *Ascomys* and *Arvi-*

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* See the 'Annals of Natural History' for October 1841, vol viii p 83

† Among the Rodents there are five truly aquatic species, (besides others which take to the water, more or less,) the Beaver, the *Ondatra*, the *Hydromys*, the *Myopotamus* and the *Hydrochæres*, the second belongs to the *Arvicolina*, the third is nearly allied to *Mus*, the fourth approaches closely to the genera *Echimys* and *Capromys*, the last is essentially a Cavy, whilst the first differs from either In nearly every family of Rodents there are burrowing species, and many possess aquatic, climbing and burrowing species Such facts are *most* common in various groups of animals.

cola there are some peculiarities which also had considerable weight in my determination to place those genera near to each other, inasmuch as the characters alluded to I have found in no other Rodents. On the other hand, the situation of the ant-orbital opening, and its small size, combined with the number of the teeth $\left(\frac{4-4}{4-4}\right)$ and their simple form, render it desirable to raise the *Ascomys* group to the rank of a subfamily. The genus *Castor* is likewise somewhat isolated, and may be regarded as a subfamily. Whether these two little sections be an offset, as it were, from the *Muridæ* or the *Sciuridæ*, is difficult at present to determine; they both want the post-orbital process to the temporal, which runs through the *Sciuridæ*; but the genus *Aplodontia* forms a connecting link to a certain extent, having rootless molars, wanting the post-orbital process, but at the same time possessing the small fifth molar in the upper jaw, placed in front of the others, which is found in no other Rodents excepting the *Sciuridæ*. The *Aplodontia*, moreover, in the form of the lower jaw, evidently links itself with the burrowing *Sciuri*. With respect to the *Myoxidæ* and *Gerboidæ* I have nothing further to add; they are well-marked sections, and it appears to me their characters cannot better be indicated in a classification than by placing them between the *Sciuridæ* and the *Muridæ*. On one point, however, I cannot quite satisfy myself, and that is the rank of these two sections,—whether they ought to be regarded as families or subfamilies. The former I am of opinion has most claim to be regarded as a family; the latter will probably merge into the *Murida*, and it will then be desirable to regard it as a subfamily, distinguishable by the large size of the ant-orbital opening to the skull, &c.

A very interesting new rodent, brought from Fernando Po by Mr. Fraser, naturalist to the Niger expedition, and described by me, under the name *Anomalurus Fraseri*, at the meeting of the Zoological Society for Sept. 27th, 1842, affords an interesting link, in some of its characters, between the *Myoxidæ* and the *Sciuridæ*. This animal,—which has the external appearance of a *Pteromys*, a very delicate and soft fur of a sooty colour on the upper parts of the body, freckled with yellow, and whitish beneath, and is remarkable for having on the under side of the basal third of the tail a double longitudinal series of large horny scales, with prominent angles, used by the animal to support itself on the trunks of the trees on which it lives,—has a skull nearly agreeing in general form with the Squirrels, but wanting the post-orbital process, and, what is moreover interesting, has a comparatively large ant-orbital opening, as in the *Myoxi*. The palate is contracted in front between the molars (which are permanently $\frac{4-4}{4-4}$), and is rather deeply emarginated behind*

Among the *Muridæ* is a tolerably well-marked section, at present limited in number of species, but to which I anticipate many novelties will be added, especially from those portions of the old world which lie between 30° and 40° north latitude, of which the genus *Spalax* may be regarded as the type, and which might conveniently be raised to the rank of a subfamily under the name *Spalacina* or *Aspalomyina* † Agreeing essentially with the *Muridæ*, the *Aspalomyina* are distinguishable by the comparative great breadth of the skull, the absence or almost total absence of the vertical slit, through which in the typical *Muridæ* the infra-orbital nerve passes, and which is defended by a nearly vertical thin bony plate, and, moreover, by the equal size of the molar teeth In this subfamily should be arranged *Spalax*, or *Aspalomys*, *Heterocephalus* (Ruppell) and *Rhizomys*

The above families and subfamilies will therefore, according to my views, be thus arranged —

Family 1 SCIURIDÆ, containing the genera *Sciurus*, *Pteromys*, *Sciuropterus*, *Xerus*, *Tamias*, *Spermophilus*, and *Arctomys*

Aberrant forms

Wanting post orbital process to the frontals

a, with large ant orbital opening, and the palate contracted between the anterior molars

* with rooted molars $\frac{4-4}{4-4}$ *Anomalurus*

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* From the same collection three new species of squirrels were also described by me One, to which I gave the name *Sciurus Stangeri* a species larger than the common squirrel, with coarse fur, freckled with black and yellow on the upper parts of the body, the abdomen very sparingly clothed, and the tail very large and bushy—also presents an interesting modification in the structure of the skull, this is unusually long, and has the ant-orbital outlet remarkably short, opening directly through the bony plate which forms the anterior root of the zygomatic arch, and not placed far forwards and in the form of a canal, as in other squirrels which I have examined The other two new squirrels, which were named *Sc rufobrachium* and *Sc leucogenys*, are of less interest the former resembles the *Sc annulatus* of authors, but is rather larger, of a richer colour, and has the posterior part of the fore- and hind legs fringed with rusty red hairs The *Sc leucogenys* is of a rich brown colour above, (a tint produced by the admixture of black and rich yellow, the hairs being freckled with the latter colour,) white beneath, has the tail chiefly of a black colour, but the hairs tipped with white, and red at the base, the mesial portion of the tail beneath is, moreover, bright rusty-red, the sides of the face, as the name implies, are white It is about equal to the common squirrel in size

† It appears from some observations by M Gervais (' Voyage de la Bonite) that the name *Aspalomys* of Laxmann has priority of date over that of *Spalax*, given by Guldenstedt, in which case I should take the name of the subfamily from the older name as well as that of the genus.

b, with small ant-orbital opening
 * with rootless molars $\frac{5-5}{4-4}$. *Aplodontia*
[Aberrant forms of *Sciuridæ* ?]
 ** with rootless molars $\frac{4-4}{4-4}$
 1 Folds of enamel to the molars simple *Ascomys*
 2 ———————————— complicated *Castor*

Family 2 Myoxidæ Genera *Myoxus*, *Eliomys*, *Muscardinus*, and *Graphiurus*

Family 3 Dipodidæ† Genera *Dipus*, *Alactaga*, and *Meriones*

Family 4 Muridæ Genera *Gerbillus*, *Psammomys*, *Mus*, *Hesperomys*, *Dendromys*, *Phlæomys*, *Cricetomys*, *Cricetus*, *Euryotis*, *Hapalotis Reithrodon*, *Sigmodon*, and *Neotoma*

Subfamily 1 *Aspalomyina* Genera *Rhizomys*, *Aspalomys*, and *Heterocephalus*

Subfamily 2 *Arvicolina* Genera *Ondatra*, *Arvicola*, and *Lemmus*

[To be continued]

XXXIII —*Description of a new species of* Genetta, *and of two species of Birds from Western Africa* By T R H Thomson, Esq , R N , Surgeon of the late African Expedition

Among the various specimens of natural productions which I collected during the late expedition is a new species of *Genetta*, differing very remarkably in colouring from the other species of this African genus I received it from the Bobys or natives of the island, and they had skinned it through the mouth without making any other incision in the skin

I have taken the opportunity of naming the *Genetta* after my friend Dr John Richardson, the Inspector of the Naval Hospital at Haslar, so well known for his highly scientific acquirements, and so much esteemed in the naval service by all his medical brethren

I may mention, from its being interesting as showing the wide geographic range of the animal, that I have brought home with me a large kind of cuff or arm-shield formed of the skin of *Colobus Guereza* of Ruppell, which has hitherto only been found in Abyssinia, where, according to Peirce, as quoted in the 'Synopsis of the Contents of the British Museum,' the skin is used for the same purpose The cuff, which consists of the greater part of the back with the white stripe, differs from Dr Ruppell's specimen of the animal in the British

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† To attain uniformity of system,—taking the name of the family from one of the principal genera it contains,—I have thought it desirable to substitute the name *Dipodidæ* for *Gerboidæ*

Museum, in the white band being considerably broader, and not furnished with quite such long hair

Genetta Richardsonii, Richardson's Genette —Rich fulvous, three streaks on the nape, numerous unequal spots on the back, side of the neck, sides and limbs, and twelve bands on the tail black, nose gray, feet grayish fulvous, scarcely spotted, legs, cheeks, throat, middle of the chest and belly and the inner side of the limbs brighter fulvous, especially on the hinder part of the abdomen, whiskers black, lower ones whitish, the pad of the toes is hairy, hair of the middle toes fulvous, of the rest gray, the central pad of all the feet bald, and the hinder foot with a narrow bald line extending nearly to the heel, like the typical *Genetta*

Length, body and head, $13\frac{1}{2}$, tail, $12\frac{1}{2}$ inches

Hab Fernando Po

I have sent the specimen of the *Genetta* and the fragment of the skin of the *Guereza* to the British Museum collection I shall now proceed to describe two birds which appear to be new

Tchitrea atrochalybeia Deep shining steel-black, with the base of each feather dull black, quills and tail black, margined exteriorly with steel-black

Length, total, $9\frac{1}{2}$ inches, bill, $\frac{7}{8}$, wing, $3\frac{1}{4}$, tarsi, $\frac{7}{8}$, tail, middle feather, $5\frac{3}{8}$, the next exterior one, $3\frac{1}{8}$

Hab Fernando Po

Porphyrio Alleni Head and neck black tinged with blue, back and wings greenish olive, tinged on the rump with bluish black, beneath the body indigo-blue, bill crimson, frontlet blue, legs and toes yellow

Length, total, $11\frac{1}{8}$ inches, bill, $1\frac{1}{8}$, wing $6\frac{1}{2}$, tarsi, 2 inches and 1 line

Hab W Africa, Idda, near the confluence of the river

Mr Gray, who kindly assisted me in determining these species, informs me, that besides the above, there has been recorded as found in Fernando Po the following species of Mammalia and Reptiles —***Colobus Pennantii*?, *C Satanas*, *Cercopithecus Martini*, *C erythrotis*, *Galago Alleni*, *Rhinolophus Landeri*, *Genetta Poensis*, *Lutra Poensis*, *Mus Alleni*, *Antilope Ogilbii*, *Chameleo Owenii* (*tricornis*), *Ch cristatus*** and ***C Bibronii***, and ***Crocodilus Leptorhynchus***

There are doubtless several others, and it is to be remarked that most of the animals found in the islands are different species to those found on the continent

I have several new species of squirrels, especially a flying squirrel with scales under the tail, and a new species of antelope, and several new species of birds, which it is my intention to describe as soon as my packages arrive from Plymouth These, with those above described, will be deposited in the British Museum, the fish which I collected I have sent to Dr Richardson at Haslar

October 15, 1842

XXXIV —*Information respecting Scientific Travellers*

MR FORBES

A FRIEND in Belfast informs us that he has received a letter from Mr Forbes dated Smyrna H M S Beacon Sept 9 1842 in which he says that the grant allocated by the British Association for dredging in the Red Sea "determines me to take Egypt on my way back and I shall start for Alexandria soon, regulating my movements so as to be in England during the early part of January' It would seem to be time for him to try new ground as he observes "Though at work every day I now so seldom get any species of the Mollusca Radiata or Fish which I have not already that it seems as if I had pretty nearly got through the treasures of the Egean' He speaks of his fever having interfered sadly with his botanical hopes but that he had previously collected in Lycia 800 species of Phanogamic plants and remarked many interesting facts connected with a number of them more especially with reference to their distribution As he is silent respecting his health it may be presumed that he was at the date of his letter perfectly recovered

J LINDEN

The young Belgian naturalist and collector J Linden has recently undertaken a second journey into South America, and intelligence of his present movements has been received to the date of April 1842 with an announcement of the despatch of his first consignment of dried plants These have since arrived in the best possible condition, and contain some which are highly interesting (a large proportion of them ferns) and they are already in the hands of his subscribers The sets contain 170 species Additional subscribers are invited to join those who have already engaged for these plants and in order to judge for themselves botanists who wish to do so can have the opportunity now of inspecting this series just distributed Each plant is accompanied by a printed and numbered label The price is fixed at 2*l* per hundred plants, and there are no extra charges for expense of freight, &c, if application be made direct to M Linden's London agent

M Linden writes thus —'After many difficulties and a most protracted and stormy passage, I am at length arrived at this first stage of my intended Colombian expedition (viz La Guayra) Before striking inland from the coast I intend to investigate the chain of mountains which border these shores, profiting by the time of year (winter) this being the only season when one can with safety traverse these very unhealthy coasts'

Under date Caracas, April 28, 1842, he also writes —"I have just sent off for you to distribute to my respected subscribers the first-fruits of my journey viz plants collected in the province of Caracas, they comprise about 170 species and will I trust, be found to contain objects of some interest, particularly the ferns, I hope also in tolerable condition notwithstanding the very unfavourable season we have had, the drought having now lasted for these five months The ferns are numerous and I think interesting, they are for the most part from the Silla de Caracas, very shortly I intend to leave this province altogether, directing my steps towards the High Cordilleras which cross the provinces of Truxilla and Merida where I shall continue my researches during the remainder of this year at least, and thence proceed into New Grenada '

It may be as well to add that M Linden s former collections from Southern Mexico were extremely good and with those who have seen them have established his character as a first rate collector It is intended to enumerate these plants somewhat in the same manner as Mr Bentham has done the plants of Hartwig the Horticultural Society s Collector

Mr Bentham has devoted one of his new Mexican genera to M Linden, *Lindenia* (a genus belonging to the *Rubiaceæ*), and some species are also described and figured in Sir W J Hooker s Icones Plantarum

BIBLIOGRAPHICAL NOTICES

Histoire Naturelle des Isles Canaries Tome Troisieme, Deuxième partie *Plantes Cellulaires* Par Camille Montagne D M

THE Cryptogamic part of this splendid work being now complete, we are anxious on account of its very great merit and usefulness to give an early notice of it The cryptogamic vegetation of the South of Europe and the Northern African isles in many respects so strongly resembles that of many parts of our own country, that any well executed work relating to them cannot fail to be of especial interest even to those whose attention is principally confined to indigenous productions So much care has been taken in the drawing up of the specific characters the selection of synonyms, and the general illustration of species, that it cannot be consulted without advantage The number of new species indeed, though considerable, by no means forms the only point of interest In one department that of Fungi, the materials which have been available by the author have been so scanty consisting almost entirely of sketches, unaccompanied by notes, that curiosity is rather excited than satisfied

The number of species of Cryptogams detected in the Canaries amounts almost to 500 but this can by no means be regarded, even exclusive of the Fungi, as anything approaching to a complete list There is not a single *Verrucaria* or *Opegrapha* in the collection which probably exist in considerable numbers Of *Sphæriaceæ* there are but three species The cryptogamic vegetation, as might be expected proves to be nearly that of the South of Europe, especially of the more southern European islands, as, for instance, Corsica and Sardinia In a second degree there is a resemblance to that of Northern and Western Africa even as far as the Cape of Good Hope, and in a third degree to that of the coasts of Portugal, France and England Some species are peculiar to the Canaries though their types exist in Europe others have been met with only in isolated points of Europe Africa or the Cape de Verd Islands

Thus *Astrodontium canariense* has been gathered in Madagascar, *Frullania hispanica* in Asturias *Plagiochasma Aitonia* in the Ionian Isles *Riccia cilifera* in Portugal *Leptogium Burgessii* in Britain *Leptogium ulvaceum* in the Marianne Islands, *Leptogium Brebissonii* in the west of France, *Capea biruncinata* on the coast of Cape Verd and Chili *Caulerpa clavifera* in the Red Sea and *Anadyomene stellata* in Brazil the Mediterranean, and Adriatic

The new species described are *Hypnum Teneriffæ Berthelotianum*, *Hookeria Webbiana Leptodon longisetus Glyphocarpus Webbii*, *Lophocolea Preauxiana Frullania nervosa*, *Fimbriaria Africana Agaricus Webbii Coprinus spiralis pilulifer*, *Plutonius*, *Cortinarius tricolor*, *Boletus Preauxii Clavaria Rhodochroa Morchella dubia Patellaria nitida*, *Phallus canariensis*, *Polysaccum tinctorium*, *Puccinia Atropæ*, *pseudosphæria*, *Æcidium Atropæ*, *Uredo Frankenia*, *Kleiniæ microcelis*, *Evernia scorigena Ramalina Webbii decipiens Solorina Despreauxii Parmelia holophæa Halymenia cyclocolpa capensis Dumontia canariensis Dasya acanthophora Polysiphonia myriococca nutans*, *Griffithsia Argus*, *Callithamnion ellipticum Anadyomene calodictyon Conferva pachynema enormis*, *Lyngbya ? cantharidosma Chroolepus ianthinus Rivularia cerebrina monticulosa*

The greater part of these species and some others not absolutely new are illustrated by the most admirable figures, as are also two new genera of Algæ, *Capea* and *Asparagopsis* nor must we forget to notice the admirable analysis of *Caulerpa* A species closely allied to *Anadyomene calodictyon* has been raised to the rank of a genus by Decaisne under the name of *Microdictyon* On this subject the author remarks in a letter lately received, Nul doute que son *Microdictyon* ne soit un bon genre reste à savoir si mon *Anadyomene calodictyon* peut y entrer sans modification des caractères Notez que Decaisne dit positivement (et cela est vrai pour l *Hydrodictyon umbilicatum* d'Agardh), qu il n'y a aucun trace de ces cellules disposées en evantail qui distinguent l *Anadyomene* Or l *A calodictyon* est parfaitement intermediaire en ce qu il presente ces veines régulièrement flabellees et qu il est depourvu de la membrane que les relie entre elles ;Ou il faut modifier les caractères génériques du *Microdictyon*, ou il faut faire un troisieme genre ’

The London Journal of Botany By Sir W J Hooker, K H &c &c
No 7, July 1842, to No 10, Oct 1842

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The Phytologist a Botanical Journal

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PROCEEDINGS OF LEARNED SOCIETIES

BOTANICAL SOCIETY OF LONDON

Sept 3, 1842 —John Reynolds, Esq , Treasurer, in the Chair

Mr B D Wardale presented numerous specimens of *Lastræa cristata* (Presl), collected at Bawsey Bottom, near Lynn, Norfolk

Mr Thomas Twining, Jun , exhibited a large collection of cultivated specimens from Twickenham

A [illegible]r was read from Mr R S. Hill, being " An Inquiry into Vegetable Morphology "

Morphology is that division of botany which takes cognisance of the various changes which occur in the condition of the vegetable organs, both such as are normal, as the transmutation of leaves into the several floral organs, as well as such as are abnormal and occur only accidentally.

Taking the above as the definition of the subject, we immediately see its divisibility into two heads, the first of which treats of regular metamorphoses which are connected with the natural structure of all vegetables, while the second includes those irregular or accidental metamorphoses which result from an imperfect or redundant performance of the several changes noticed under the first head.

These last influence particular plants or parts of plants and occur only in occasional instances. To this division belongs the consideration of double and other monstrous flowers.

Of regular metamorphoses.—The great principle of regular morphology is that the various floral organs are but modifications of one common type, which is the leaf.

Lindley endeavours to give Linnæus the credit of having been the author, or at least of having suggested the idea of this great fundamental principle, and in proof of this opinion quotes passages from his Systema Naturæ and Prolepsis Plantarum, in which the theory is imperfectly hinted at. At his suggestion the subject does not appear to have been taken up, nor was it at all until Goethe published in 1770 his work On Vegetable Metamorphosis. With a knowledge of the character of his poetical writings, it hardly need excite surprise that botanists of the day should have been sceptical on a subject so new, and at first sight so opposed to the dictates of common sense. By the appearance of this work, however, the attention of botanists appears to have been roused to the subject, and the result of their investigations tended to confirm the correctness of his views.

Leaves are in many instances entirely wanting, or exist only in the degenerated forms of scales and spines. In these cases there is hardly any part of a plant which is not susceptible of being modified and rendered capable of performing the functions of leaves. For this purpose we find the excessive development of the stem which obtains throughout Cactaceous plants; also the stem is furnished with leafy wings or expansions which run down its sides, as is seen in *Acacia ciliata*, &c. The petiole in the form of the *Phyllodium* frequently takes upon itself the office of the leaf, as in most of the Acacias from New Holland. The same functions are frequently discharged by the peduncle, as in *Ruscus*, *Asparagus*, &c., and this appears to be the true character of the leafy organs of ferns, the true leaves of which exist in the degenerated form of scales, known by the name of ramenta.

The calyx consists of a series of leaves arranged in a whorled manner round the axis, either distinct or more or less combined, according to the character of the plant under consideration.

To prove our position with this series of a genus we must refer to the condition of parts in *Cactaceæ*, where we have a gradual transition from bracteæ to sepals, so that it is impossible to say where the one terminates and the other begins. Examples of partial reversion of the calyx to the character of the leaf are seen in specimens of *Trifolium repens*, the *Polyanthus* of the gardens, and in cultivated roses. In monstrous specimens we sometimes meet with the petals becoming leafy, of which M. DeCandolle gives a remarkable example in *Anemone nemorosa*, and the author had not unfrequently seen the same condition occurring in the petals of *Papaver Argemone*. Stamens appear to be formed from petals by the gradual narrowing of their lower part so as to form the filament, while the anthers develope themselves on the upper margins. The only instance with which the author was acquainted where the carpellary leaf is to be found in an expanded or unfolded state naturally occurs in the order *Coniferæ*, where it simply covers but does not inclose the ovules. The carpellary leaf in this condition manifestly approaches a bractea. It was announced that the paper would be continued at the next meeting.

Mr. Adam White laid before the Society a selection of the plants he found in the beginning of August last at Whiting Bay, Isle of Arran. He made some observations on the mild climate of the sheltered coast, where even during winter, as Dr. M'Naughton, in the 'New Statistical Account of Scotland,' writes, 'many of the plants of warmer regions stand the whole winter in the open air, as in Mr. Paterson's garden at the Whitehouse, and in the Duke of Hamilton's at Broderick Castle.' He referred to the Rev. David Landsborough's list of the rarer plants found in Arran, and to Professor Gardner of Glasgow having lately found the *Fumaria Muhlenbergii* in tolerable abundance when on a trip with Mr. Landsborough.

ZOOLOGICAL SOCIETY.

Dec. 14, 1841.—Richard Owen, Esq., Vice President, in the Chair.

The following paper by Mr. Lovell Reeve, "On *Lingula*, a genus of Brachiopodous Mollusks," was then read:—

"The *Lingulæ* belong to a group of Bivalve Mollusks differing materially in their system of organization from any other of the great tribe of *Acephala*. They have received the title of 'the *Brachiopoda*' on account of their being provided with two long spirally twisted arms, and are distinguished by other not less important particulars. The soft parts are differently arranged within the shell from those of other Bivalves; the valves are not united by any ligament, and there is a very distinct change in the arrangement and position of the breathing apparatus. Although Pallas has given a short anatomical description of the *Terebratulæ*, it was not until the appearance of Cuvier's memoir on the anatomy of *Lingula*, that the true characters of these remarkable animals became known; it was then determined that the *Brachiopoda* should be set apart in a separate and distinct class. The anatomy of the *Terebratulæ* and *Orbiculæ* has since been most elaborately set forth by Prof. Owen in the Transactions of this Society, and agrees in all its essential particulars with that of the *Lingulæ* previously described by Cuvier, subject however to certain modifications arising from the different situations they inhabit. The *Lingulæ*, which are provided with a long pedicle, commonly live near the surface, and are found at low water partially buried in the sand for the protection of their fragile shells against the violence of the tides; the *Terebratulæ* on the contrary are found in deep water attached in clusters to fragments of rocks and corallines by a bunch of short fibrous tendons issuing through an orifice in the shell.

The essential points in which these animals differ from other Bivalve Mollusks are as follow:—*First*, in the position of the soft parts within the shell; in the *Brachiopoda* the dorsal part of the visceral mass is against one valve and the ventral part against the other, whilst in most of the *Tropiopoda* the back is placed directly against the hinge and the sides against each valve. *Secondly*, in being provided with a pair of retractile brachia or arms: in the place usually occupied by the branchiæ are two long spirally twisted arms, generally more or less fringed, and so strongly resembling in some species the branchiæ of the *Tropiopoda* that they were at one time thought to be the true organs of respiration. These retractile arms are said to be in constant activity for the purpose of producing an inward current of water for the capture of animalculæ and other alimentary prey. *Thirdly*, in the arrangement and position of the branchiæ: instead of the organs of respiration being distinctly formed in lateral lamellæ upon the body, as in the *Lamellibranchiate Tropiopoda*, they consist of a number of beautiful veins and arteries incorporated within the substance of the two lobes of the mantle. The calcifying organ of the *Brachiopoda* therefore has a double function; in addition to its usual property of secreting the calcareous mucus for the formation of the shell, it is made subservient to the circulation of the aerated water. Prof. Owen observes that in this profuse distribution of vessels over a plain membrano-mucous surface we perceive the simplest construction of the *water-breathing* organ, presenting a beautiful analogy with the elementary forms of the *air-breathing* organ in the *pulmoniferous Gasteropoda*. In consequence of this new arrangement of the respiratory system the title of the *Brachiopoda* has been changed by De Blainville for that of the *Palliobranchiata*, or mantle-breathing Mollusca. The muscular system in these animals appears to be most complex; the *Lingulæ* and *Orbicula* are provided with three pairs of muscles, and the *Terebratulæ* have four. The large muscles are destined to open and close the shell in the absence of a hinge ligament; and the small ones assist in sliding one valve over the other for the admission of water.

Until within the last few years only one species of *Lingula* was known, and previous to the publication of Cuvier's memoir before alluded to, the shell of this singular animal gave rise to much speculation amongst naturalists. Linnæus, upon the discovery of an odd valve of *Lingula* exhibiting no trace of any hinge ligament, described it as a *Patella*. Both Rumphius and Favanne took it to be the calcareous shield of a *Limax* or land slug. Chemnitz upon finding that the shell of *Lingula* was really bivalve placed it with the *Pinnæ*, and even Dillwyn includes it with the *Mytili*. Bruguiere was the first to distinguish it by its present title in the plates of the 'Encyclopédie Méthodique,' in which he has been followed by Cuvier, Lamarck, and all succeeding writers.

With regard both to the situation that the *Brachiopodous Mollusca* should occupy in the natural system as well as the rank to which they are entitled in the classification, authors have been much divided. By Dumeril and De Roissy they were associated in a particular class with the *Lepades*, on account of a fancied resemblance in their spirally twisted arms to the cirrous tentacula of those animals; they differ however in not being articulated, and their relation altogether with the *Lepades* is one of very remote analogy. Cuvier distinguished them as a new and separate class, but still arranged them next in order to the *Lepades*. Lamarck placed them at the end of his '*Conchifères monomyaires*' merely as a family of that order. Prof. Owen and Deshayes both consider that they are entitled to take the rank of an order; the latter author however admits that there is far less affinity between the *Brachiopoda* and the rest of the acephalous mollusks than there is between the acknowledged divisions of *Bimuscular* and *Unimuscular*. In the arrangement of my 'Systematic Conchology' I propose to adopt the still higher rank that was assigned to them by Cuvier, namely that of a class, placing them according to Lamarck at the end of the *Acephala*, upon the presumption that their branchial apparatus presents a modification of structure intermediate between that of the proximate classes the *Tropiopoda* and the *Gasteropoda*.

The *Lingula* come with great propriety at the commencement of the class, because they have the nearest affinity with the *Tropiopoda*; their body is larger in proportion to that of the rest of the *Brachiopoda*, and although the branchiæ are incorporated within the substance of the mantle, they nevertheless present a certain indication of the lamellar structure. Lamarck placed them at the end of his family of '*Les Brachiopodes*,' because in having referred the *Craniæ* to his fossil family of *Les Rudistes*, he found it necessary to follow up their affinity with the *Orbiculæ*; his arrangement of the genera therefore is the reverse of that I have adopted.

'The *Lingula anatina* was for a long time the only species known; another one, the *Lingula hians*, was described by Swainson in his 'Zoological Illustrations,' and we are indebted to Mr. Cuming for five new ones: two, the *Lingulæ Audebardii* and *semen*, have been already described by Mr. Broderip in the Transactions of this Society, and I have now the pleasure of introducing three which I believe to be entirely new to science.

LINGULA OVALIS. *Ling. testâ angustâ elongato-ovali, glabrâ quasi politâ, olivaceo-viridi, apice acuminato, valvis utrinque clausis.*

Hab. —— ?

Long. $1\frac{3}{10}$, lat. $\frac{6}{10}$ poll.

This shell which approaches rather in appearance to that of the *Lingula anatina* may nevertheless be distinguished by its complete oval form though it is somewhat acuminated at the apex, the umbones are much less prominent and the valves are more compressed, and more closely united all round

LINGULA TUMIDULA *Ling testa corneâ tenuissimâ rubro olivacea, subquadratâ versus apicem parùm attenuata umbonibus vix prominulis, valvis tumidulis marginibus irregulariter reflexis*
Hab ad oras Novæ Hollandiæ
Long $2\frac{1}{10}$ lat $1\frac{3}{10}$ poll
Reeve Conch Syst v i p 180 pl 125 f 4

The shell of the *Lingula tumidula* differs materially both in size and composition from that of any of the previously known species it is considerably larger and thinner and rather horny than calcareous and the colour of it is a burnt olive red From the swollen appearance of the valves I am inclined to think that the shell is perfectly pliable and elastic during the life of the animal

LINGULA COMPRESSA *Ling testâ corneâ tenuissimâ valde compressa fusco olivacea subquadrato ovali versus apicem attenuatâ umbonibus depressis indistinctis, valvis utrinque clausis*
Hab ad Palanam ins Masbate Philippinarum
Long $1\frac{1}{10}$ lat $1\frac{1}{10}$ poll

This curious species was found by Mr Cuming in sandy mud at low water at Palanas Island of Masbate one of the Philippines Its shell is of the same thin horny composition as that of the *Lingula tumidula* in fact I at first took it to be merely a local variety of that species Upon comparison however I feel assured that it is distinct it is more attenuated towards the apex and from the valves being remarkably compressed and closely united all round I am induced to suppose that the animal must be proportionably smaller The two specimens from which the above description is drawn do not exhibit the pallial cilia, which Mr Cuming s usual care would have protected they may therefore not have been exserted beyond the margin of the valves He did not succeed in obtaining the pedicle of this species

' Mr Cuming exhibits on this occasion specimens of all the known *Lingulæ* from his own collection, and I am not aware that four species out of the seven exist in any other They belong to a class of mollusks of which few recent varieties are known and may therefore be highly esteemed for their conchological interest "

The next paper read was from Mr G B Sowerby, jun , and is entitled ' Descriptions of nine species of the genus *Pupina* "

Gen PUPINA, Vignard

Molluscum terrestre
Testa subcylindrica vitrea nitidissima, anfractibus quinque ad sex, penultimo inflato ultimo paululùm coarctato, apertura circulari, margine crasso reflexo, ad basin columellæ inciso vel emarginato
Operculum corneum spirale

The glassy enamel which gives a brilliant polish to the small terrestrial shells composing this genus seems to distinguish them even from those species of *Cyclostoma* which most nearly resemble them in having a pupiform shape and a notch at the base of the columella The question has been asked Why not make this marginal notch the criterion of the genus? The answer is found in the following facts first, the notch is found in *Cyclostomata* which have no other character in common with *Pupinæ*, second that several *Cyclostomata* have a canal at the lower part of the whorl which if continued would form a similar notch third that our *Pupina lubrica*, which could scarcely be separated from the genus has but a very slight emargination

The first species described under this generic name was *P Keraudrenii* published by Vignard in the Annales des Sciences 1829 Mr Grateloup subsequently described *P Nunezii* under the generic name *Moulinsia*, neither of these naturalists being acquainted with the operculum

All the species here described, with the exception of *P antiquata* and *P Keraudrenii* were recently brought to this country by Mr Cuming from the Philippines

* Species spirâ axe retrorso

Pupina Nunezii *Moulinsia Nunezii*, Grateloup, Ann Soc Linn Bordeaux, 1840 *P Nunezii*, Sow jun Thesaurus Conchyliorum part 1 f 8 9 10, 11 Published May 1842 *Testa globosa obliqua, aperturâ magna, margine valide expanso reflexo complanato, incisurâ triangulari penitus diviso, labio columellari concavo anfractu ultimo prope aperturam subcomplanato*

Long 50, lat 35 poll

Hab ad insulas Samar Luzon Catanduanus et Siquijor Philippinarum

Var *a* *Fusca margine flavido* Samar

Var *b* *Flavida, margine aurantiaco* Albay, ins Luzon

Var *c* *Fulva rufescens* Ins Catanduanus

Var *d* *Alba, prope aperturam purpureo-cincta margine flavido* Ins Leyte

More globose than any other species the spire turned backwards the penultimate whorl elevated the last whorl flattened in front the incision of the peritreme deep, the columella grooved, varying in colour from bright orange to cream-white and dark brown, the margin always either orange or yellow Found on leaves of small plants and low bushes in several of the Philippine Islands

Pupina pellucida, Sow jun, Thesaurus Conch part 1 f 18 19, 20 *Testa obliqua, subglobosa, pellucida, spiræ axe valdè retrorso, anfractu penultimo elevato, ultimo complanato margine reflexo, incisurâ diviso, columellâ latâ convexâ*

Long 30 lat 20 poll

Hab ad insulas Luzon et Zebu, Philippinarum

Var *a* *Fulva* Daleguete, ins Zebu

Var *b* *Fusca fulvescens, minor* Bongabon, ins Luzon

Smaller more transparent and with the spire more bent than the last, the outer lip less expanded the notch completely dividing the peritreme, and the columella convex Found on small plants in woods

* * Spira penè recta

Pupina lubrica, Sow jun Thesaurus Conch part 1 f 12 to 16 *Testa subobliqua, cylindrica, spira brevi obtusa aperturâ rotundatâ, margine antice subexpanso, paululum incrassato, ad basin columellæ vix emarginato, columella callosa*

Long 35 lat 25 poll

Hab ad insulas Panay, Siquijor et Luzon, Philippinarum

Var *a* *Fulva* Ins Panay

Var *b* *Fulva minor* Ins Siquijor

Var *c* *Alba translucida* Ins Siquijor

Var *d* *Grisea fulvescens* Ins Luzon

Var *e* *Alba* Calauang, Laguna, ins Luzon

In this species the notch is scarcely perceptible, and there is a rounded callosity behind the columellar lip The inner lip is thickened on the body whorl Found in dense woods on small plants

Pupina vitrea Sow jun, Thes Conch part 1 f 6, 7 *T subelongata recta anfractibus subrotundatis, margine expanso, reflexo, complanato incisurâ diviso*

Long 50 lat 25 poll

Hab Ins Mindinao et Luzon, Philippinarum

Var *a* *Fulva, margine luteo* Albay, ins Luzon

Var *b* *Fulva, margine aurantiaco* Cagayan, pr Misamis, ins Mindinao

The spire is straight and elevated, gradually tapering towards the obtuse apex, the peritreme is expanded and flattened, the notch deep

Pupina similis, Sow jun, Thes Conch part 1 f 4 5 *Testa fulva subelongata recta anfractibus subrotundatis, margine pallide fulvo expanso, reflexo, rotundato, crasso, incisurâ usque ad dorsum diviso*

Long 45 lat 26 poll

Hab Bolino provinciam Zambales, ins Luzon

Resembling *P vitrea*, but the margin not flattened, and the notch so deep that it is seen at the back of the shell Found on leaves of bushes and trunks of trees in the island of Luzon

Pupina exigua, Sow jun Thes Conch f 17 *Testa parva translucida, alba, cylindrica, anfractu penultimo inflato, margine aperturæ paululùm incrassato, incisurâ diviso*

Long 26 lat 16 poll

Hab St Nicholas ins Zebu Philippinarum

This small, transparent white species has the margin very little thickened and the notch deep Found on small plants

* * * Spira rectâ aperturâ bicanaliculata

Pupina humilis, Jaquenot, Sow jun, Thes Conch part 1 f 2

Testa ovali solida pallide lutea anfractibus subrotundatis ultimo prope aperturam paululùm complanato, aperturâ rotundatâ margine crasso expanso reflexo, labio interno crasso postice plicato, columellâ crassâ latâ tortuosa, reflexâ, incisura ad dorsum latâ

Long 60 lat 40 poll

Hab —— ? Mus Cuming

This being a dead shell has lost the brilliancy of the enamel The teeth or folds at the posterior part of the inner and outer lips form a very distinct canal The columella is tortuous and turned backwards, and the notch is seen at the back like the canal of a Buccinum

PUPINA KERAUDRENII Vignard Sow jun Thes Conch part 1 f 2

Testa parva cylindricâ griseo rufescens, spira obtusâ rectâ aperturâ parvâ margine incisura diviso, labio externo leviter incrassato postice subplicato, labio interno plicato

Long 30 lat 15 poll

Hab Manilla and Singapore ? Mus Stainforth, Sowerby

A pupiform species with a posterior canal

PUPINA BICANALICULATA Sow jun , Thes Conch part 1 fig 1

Testa parva ovalis alba, translucida, anfractibus ventricosis, aperturâ magna margine subexpanso subincrassato ad basin columellæ inciso, labio interno posticè plicato

Long 26, lat 16 poll

Hab St Nicholas ins Zebu Philippinarum

This species differs from *P Keraudrenii* in shape being more ventricose having a tapering spire and a very strong fold on the inner lip Found on small plants in the island of Zebu

The following paper entitled Descriptions of four species of the genus *Chiton* brought by H Cuming Esq from the Philippine Islands," also by Mr G B Sowerby, jun , was then read —

CHITON PULCHERRIMUS *Ch Testâ ovali, angulatâ, ad dorsum elevata, pallide subviridi, fasciis binis rubris distantibus dorsalibus, maculis rubris dorsalibus et lateralibus nonnullis intus viridi, areis centralibus longitudinaliter foveolatim sulcatis, areis lateralibus prominentibus, utrinque granulatim tricostatis, areis terminalibus costis moniliformibus numerosis radiatis, margine minute squamoso maculis rubris fasciato*

Long 95 lat 55 poll

Hab Gindulman, ins Bohol, Philippinarum H Cuming legit

The few specimens of this shell which have been brought in fine condition present an appearance of exquisite finish and great beauty, both in sculpture and colouring They were found in the crevices of rocks at low water

CHITON LAQUEATUS *Ch testâ ovatâ, depressâ, granulatâ pallidè fulvâ vel viridescente, purpureo et viridi maculatâ, costâ dorsali purpureâ, sublævi , valva prima costis quinque laqueata , valvis medianis unicostatis ad latera quadratis , valva ultima valdè de-*

pressâ margine lato irregulariter rugoso rubro, viridi alboque maculato Variat testa angustiore margine rosea

Long 55, lat 45 poll

Hab Calapan ins Mindoro Philippinarum H Cuming legit

Remarkable for the character of the first valve which is broadly fluted by five radiating ribs The four or five central valves in several specimens, are nearly covered by a dark purple colour, the two last patched with green, and the first nearly white, but subject to some variations Found in coarse sand among small stones at a depth of nine fathoms

Chiton floccatus *Ch testâ ovali depressâ, anticè angustatâ pallidè fulvâ, nigro, fusco, viridi, roseoque maculata valvis terminalibus radiatim sulcatis valvis medianis utrinque unicostatis areis centralibus longitudinaliter sulcatis, areis lateralibus granulatis marginibus serratis valva terminali obtusè elevata, margine rubro vel fusco maculis et punctis albis fasciato*

Long 80 lat 45 poll

Hab Cagayan Misamis, ins Mindinao, Philippinarum H Cuming legit

This species is found at Mindinao under stones at low water, and at Calapan on small stones at a depth of fifteen fathoms The margin is sprinkled with white patches resembling flakes of snow, on a reddish brown ground

Chiton Luzonicus *Ch testâ ovali angulata straminea, viridi longitudinaliter strigata valvarum areis terminalibus et lateralibus radiatim granulatis, areis centralibus acute longitudinaliter sulcatis margine sublævi*

Long 35 lat 20 poll

Hab Sorsogon, pr Albay, ins Luzon, Philippinarum H Cuming legit

This small and apparently insignificant shell is very sharply ribbed in the central areas and presents a very nicely sculptured surface when viewed through a magnifying glass The specimens were taken on dead shells at a depth of fifteen fathoms

Mr Waterhouse next proceeded to characterize the following new species of *Curculionidæ* from the collections of Mr Darwin and Mr Bridges

Divisio CLEONIDES Schoenherr

Genus Listroderes, Scho

Listroderes subcostatus *Listr niger, opacus, fusco squamosus, antennis piceis, rostro brevi carinato, thorace punctatissimo, subquadrato posticè angustiore setis fuscescentibus instructo, elytris punctato-striatis, fusco setosis, interstitiis alternatis subelevatis*

Long corp et rostri, 6 lin, lat $2\frac{1}{4}$ lin, long $4\frac{3}{4}$, lat 2 lin

Hab Valleys of Petorca

Rostrum about half as long again as the head, with three costæ above the central one but little developed and the lateral costæ indistinct, the space between the costæ finely rugose, the whole surface of the rostrum covered with distinct yellowish hairs Head thickly punctured the punctures confluent, and with an impressed point between the eyes Thorax about one-third broader than long, emarginated in front, nearly straight behind, but slightly indented in the middle the broadest part of the thorax is about the interior third from this point it is contracted in width, both before and behind in nearly equal proportions, the upper surface is nearly flat, and very thickly and distinctly punctured, the punctures more or less confluent a faint dorsal ridge is sometimes perceptible, small spiny semierect hairs cover the thorax elytra moderately long with the humeral angles forming right angles the apex rounded the width about one fourth greater than that of the thorax, the upper surface moderately convex covered with brown scales, and having interspersed erect spiny hairs, punctate-striated the interstices very finely shagreened, the third, fifth and the seventh from the suture raised a few black spots are irregularly scattered over the elytra and in some specimens are some whitish spots arranged in lines on the apical portion of the elytra

From the collection of Mr Bridges

Listroderes pilosus Listr niger opacus, setosus, fusco-squamosus, antennis tarsisque fuscescentibus, rostro indistinctissime carinato, thorace crebre punctato subquadrato, lateribus subrotundatis, elytris punctato striatis Capite thorace, elytrisque squamis fuscis atque nigrescentibus dense tectis

Long corp et rostri, $3\frac{1}{3}$ lin, lat $1\frac{1}{4}$ lin

Hab Valleys of Petorca

About equal in size to *Sitona fusca* Rostrum a trifle longer than the head, slightly rugose and with a very indistinct longitudinal carina Head thickly punctured, the punctures confluent and an impressed line between the eyes Thorax subquadrate and somewhat depressed, very thickly but not coarsely punctured, the punctures confluent, the width greater than the length, the sides nearly straight and parallel, excepting near the base and apex of the thorax, where the width is gradually contracted Elytra but little wider than the thorax, somewhat convex and elongated the humeral angles rounded and the apical portion rather attenuated, but with the tip rounded the sides subparallel, punctate-striated, the punctures of moderate size are rather close together, the interstices of the striæ nearly flat, and apparently slightly rugose

The sculpturing of the rostrum head thorax and elytra is with difficulty examined all these parts being densely clothed with scales these are chiefly of a brown colour but in parts they are of a blackish hue On the thorax is an indistinct dusky line in the middle, and one or two dusky patches at the sides, the elytra are variegated with deep and pale brown

From the collection of Mr Bridges

Listroderes costirostris, Scho Several specimens of this species are contained in Mr Darwin's collection having been collected at Maldonado and there are, moreover, specimens collected at Coquimbo which present no distinguishing character, excepting in being of a larger size, viz. total length $5\frac{1}{2}$ lines, width $2\frac{1}{4}$ lin.; those from Maldonado being $4\frac{1}{2}$ lines in length and $1\frac{3}{4}$ in width.

LISTRODERES ROBUSTUS. *List. breviter ovatus, niger, opacus, fusco squamosus setosus; antennis fuscescentibus; rostro longiusculo carinato pilis minutis decumbentibus tecto; thorace crebre punctulato brevi, vitta alba ornato, lateribus subrotundatis; elytris breviter ovatis punctato striatis fascia albescente, ad latera interrupta ornatis, singulatim tuberculo subapicali instructis.*

Long. corp. et rostri, $4\frac{1}{3}$ lin.; lat. $2\frac{1}{5}$ lin.

Hab. Coquimbo.

In size and form this species may be compared to the *Phytonomus punctatus*. Rostrum about twice as long as the head, covered with minute decumbent brownish hairs, and with a longitudinal carina. Thorax rather broader than long, very suddenly contracted in front and broadest near the fore part, the sides slightly rounded, or nearly straight; the posterior angles rounded, and the posterior margin indistinctly produced in the middle; the surface very thickly punctured and covered with pale brownish scales, and having interspersed minute hairs; in parts the scales assume a deeper hue, and in the middle is a whitish line. Elytra about one-third broader than the thorax, convex, and of a short ovate form; punctate-striated; the interstices obscurely punctured and slightly convex; they are covered with brownish scales and have interspersed minute pale hairs; rather behind the middle is a broadish curved mark, which is obliterated on the sides of the elytra; and towards the apex is a small angular tubercle.

From the collection of Mr. Darwin.

LISTRODERES APICALIS. *Listr. squamosus fusco-albescens, antennis piceis, rostro carina longitudinali fusca, capite notis duabus fuscis antice convergentibus, thorace antice quam postice latiore, ad latera fere recto, antice foveâ incurvata, lineâ albâ longitudinali; elytris thorace duplo latioribus punctato striatis, singulis notâ nigrescente obliquâ, ad apicem albescente, tuberculo distincto subapicali.*

Long. corp. et rostri, $3\frac{1}{4}$; lat. $1\frac{1}{3}$ lin.

Hab. Monte Video.

This species is considerably less than the *L. costirostris*, being about equal in size to the *Phytonomus rumicis*. The rostrum is rather slender, nearly twice as long as the head, covered with minute decumbent hairs, which are of a whitish brown colour; in the middle is a longitudinal carina. The thorax is broader than long; the broadest part is considerably in front of the middle; in front it becomes somewhat suddenly contracted; the sides of the thorax converge from near the anterior part towards the base, and are nearly parallel; the posterior margin is slightly rounded, being produced in the middle; the hinder angles are obtuse; the upper surface of the thorax is nearly plane, presenting scarcely any convexity, and in the fore-part is a curved impression, the extremities of which lead up to the anterior angles; it is densely clothed with scales, and these are of a very pale brownish colour in parts the scales are of a deep brown colour, and in the middle is a longitudinal line, formed of whitish scales, besides the scales are some very minute semierect scattered dusky hairs, the sculpturing cannot well be seen, owing to the covering of scales but the thorax appears to be very thickly though not coarsely punctured The elytra are oblong about one third broader than the thorax, the humeral angles are prominent and rounded, the sides nearly straight and the apex rounded, the surface is convex but somewhat depressed at the basal portion of the elytra, punctate striated covered with pale brownish scales, having moreover some very minute scattered spines, the third and fifth interstices of the stria on each elytron are slightly raised, rather behind the middle is an oblique deep brown patch behind which the scales are white or nearly so a distinct angular tubercle is observable on each elytron, at a short distance from the apex The legs and antennæ are brown and covered with minute palish hairs, near the apex of each of the femora is a whitish ring

In the collection of Mr Bridges are several species of *Curculionidæ* closely allied to *Listroderes* but differing in having the antennæ more slender and elongated, the club is very long distinctly jointed, and very slightly incrassated the legs are longer and the body is covered with minute hairs or hair like scales whilst all the species of *Listroderes* examined by me have the body distinctly clothed with scales Moreover in none of the insects under consideration do I find the tubercles on the apical portion of the elytra, which are so common in the *Listroderes* Such differences, though readily seen, it is impossible to express by a generic term I have determined to designate this new genus by the name

ADIORISTUS*, nov gen

Antennæ longæ, tenues scapus ad apicem subincrassatus articuli funiculi obconici 1° longo, clava elongata distincte triarticulata

Rostrum capite fere duplo longius, crassiusculum, subarcuatum, versus apicem incrassatum, suprà carinatum mandibulæ tenues paulo elongatæ

Oculi subovati subdepressi

Thorax transversus, pone oculos lobatus, suprà subdepressus

Elytra elongato ovata, convexa, ad apicem rotundata

Tarsi elongati, subtenues, subtus spongiosi

ADIORISTUS PUNCTULATUS *Ad niger fusco-pilosus, antennis, tibiis tarsisque piceis, rostro brevi, crasso carinato, thorace punctulato, brevi subquadrato, anticè angustiori, postice utrinque subemarginato, elytris oblongo-ovatis, convexis punctato-striatis, interstitiis alternatis maculis parvulis nigris atque albescentibus ornatis*

Long corp et rostri $6\frac{1}{3}$ — $8\frac{2}{3}$ lin, lat $2\frac{1}{2}$ — $3\frac{1}{3}$ lin

Hab Valleys of Petorca

The whole insect is covered with minute decumbent hairs, and these are of an ashy-brown colour The rostrum is stout, considerably dilated at the apex, and about twice as long as the head,

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* From *αδιοριστος*, *undefined*, &c

rugose, and has fine longitudinal keels on the upper surface of which the central one is most strongly developed and the one next it on each side indistinct. The head is convex above and thickly punctured. The thorax is about one-third broader than long the anterior margin is straight, and the lateral margins are very nearly straight the anterior part is rather narrower than the hinder part, the hinder margin is in the form of a segment of a circle being produced in the middle and joins the lateral margin so as to form a somewhat salient but obtuse angle the upper surface is but very slightly convex and thickly and distinctly punctured. The elytra are convex and of an elongate ovate form and scarcely one third broader than the thorax the upper surface is densely clothed with minute hairs punctate striated the punctures not very large, and distinctly separated the interstices are plane or indistinctly convex, and are very finely punctured. On each stria is a series of small black and whitish spots and these most of them are oblong.

ADIORISTUS ANGUSTATUS. *Ad. niger fusco-pilosus, antennis, tibiis tarsisque fuscescentibus, rostro brevi crasso carinato, thorace punctulato ad latera et postice subrotundato, elytris thorace paulò latioribus, elongatis subovatis, punctato striatis maculis parvulis nigris ornatis.*

Long. corp. et rostri, 5½ lin. lat. 2 lin.

Hab. Valleys of Petorca.

This species closely resembles the last in many respects and especially in its colouring and in being covered with minute ashy brown decumbent hairs but it is of a narrower and more elongated form and of a much smaller size.

The rostrum is about half as long again as the head rugose, and has three parallel keels on the upper surface of which the central one is the most prominent. The head is thickly punctured. The thorax is scarcely one third broader than long slightly emarginated in front the sides are nearly straight and parallel but near the anterior part they gradually converge so as slightly to contract the width of the thorax at this part about the posterior third of the thorax the sides also converge towards the posterior margin so that the thorax may be described as obliquely truncated on each side behind the posterior margin is straight the upper surface is nearly flat, and thickly and distinctly punctured. The elytra are moderately convex and of an elongated ovate form, and about half as broad again as the thorax, punctate striated the punctures of moderate size and distinctly separated excepting on the hinder part of the elytra they are densely clothed with decumbent ashy brown hairs and on each stria is a series of oblong blackish spots the interstices are very delicately but thickly punctured.

ADIORISTUS CONSPERSUS. *Ad. niger subopacus fusco pilosus, antennis tarsisque fuscescentibus, rostro brevi crasso carinato, thorace punctatissimo, subquadrato postice paulo angustiore, modice convexo, lateribus subrotundatis, elytris quoad latitudinem thorace fere coaequalibus lateribus subparallelis punctato striatis interstitiis planis.*

Long. corp. et rostri, 5$\frac{1}{2}$ lin.; lat. 2$\frac{1}{4}$ lin.
Hab. Valleys of Petorca.

Rostrum about half as long again as the head, much dilated at the apex, with three distinct carinæ, and the two outer carinæ converging slightly towards the base of the rostrum; between the carinæ are minute longitudinal rugæ, but these are hidden by the numerous small brownish hairs which cover this and other parts of the insect. The head is thickly punctured, and there is a minute oblong depression between the eyes. The thorax is subquadrate, about one fourth broader than long, the anterior margin is straight, the sides are slightly rounded, but nearly straight towards the hinder part of the thorax, the greatest width is at the anterior third, the posterior margin is straight, and the posterior angles are very nearly right angles; the upper surface is nearly flat, being but very slightly convex, and thickly but rather finely punctured. The elytra are moderately elongated, but little broader than the thorax, and moderately convex above; the sides are nearly parallel, being very little dilated in the middle; the apical portion is rounded; they are punctate-striated, and the interstices are finely punctured; a series of small blackish spots is observable on each of the striæ; on other parts the very minute hairs which cover the elytra are brownish.

Adioristus similis. *Ad. piceo-niger, pilis fuscescentibus tectus, antennis piceis, rostro brevi, carinato, ad basin transversìm impresso, thorace rugoso-punctato, subcylindraceo, lateribus paulo rotundatis, elytris oblongo-ovatis, punctato-striatis, punctis aliquanto profundis, interstitiis ferè planis et punctulatis.*

Long. corp. et rostri 3$\frac{3}{4}$ lin.; lat. 1$\frac{2}{5}$ lin.
Hab. Valleys of Petorca.

A small species, about equal in size to *Phyllobius alneti*. The rostrum short and stout, being but little longer than the head, is furnished with a central carina and a carina on each side, which is less distinct, and the space between these ridges has longitudinal rugæ, which are partially hidden by the scattered hairs which cover this and all other parts of the body. The head is thickly punctured, and the punctures are confluent; a small oblong impression is observable between the eyes, and in front of the eyes is a transverse depression, separating as it were, the rostrum from the head. The thorax is nearly cylindrical, broader than long, and slightly narrower behind than near the fore part; the anterior and posterior margins are straight; the upper surface is thickly and rather coarsely punctured, and the punctures are many of them confluent. The elytra are of an elongated ovate form, convex, somewhat attenuated, but rounded at the apex; punctate-striated, the punctures moderately large and rather deep, and nearly joining each other; the interspaces between the striæ are nearly plane, indistinctly punctured in parts and slightly rugose; the minute but somewhat spiny hairs which cover the elytra are not sufficiently abundant to hide the sculpturing, and are semi-erect.

A species of the present genus is contained in Mr. Darwin's collection, which differs from either of the above; it is almost destitute of the small hairs which give the brownish colouring to the other species here described.

Adioristus subdenudatus. *Ad. oblongus, niger, pilis minutissimis atque squamulis albescentibus adspersus; antennis tarsisque fuscescentibus; rostro carinato, punctulato; capite inter oculos transversim impresso, crebre punctulato; thorace subcylindraceo, in medium paulo dilatato, punctis minutis impresso; elytris oblongo-ovatis, punctato-striatis, interstitiis paulo convexis, obsolete punctulatis.*

Long. corp. et rostri, $6\frac{1}{2}$ lin.; lat. $2\frac{1}{4}$ lin.

Hab. Mendoza.

This insect is intermediate in size between the *Ad. punctulatus* and *Ad. angustatus*, and is readily distinguished from either of the species here described by its denuded appearance, the scales and hairs which are sparingly scattered over the body, only become visible with the assistance of a moderately strong lens.

The rostrum is about twice as long as the head, very thickly though finely punctured, and the punctures are confluent; in the middle is a distinct carina. The head is separated from the rostrum by a transverse and somewhat shallow depression, and in the middle of this depression is a small fovea; the upper surface of the head as well as the thorax is very thickly and finely punctured, and the punctures are confluent. The thorax is rather broader than long, subcylindrical, truncated before and behind; the upper surface is slightly convex, and the sides are somewhat rounded, being slightly dilated a little in front of the middle. The elytra are of an elongate-oval form, moderately convex, somewhat attenuated at the apex, but with that part rounded; they are distinctly punctate-striated; the punctures are arranged closely together, and the interstices of the striæ are narrow, slightly convex and very delicately punctured.

Cylydrorhinus angulatus.—Under this name M. Guerin Meneville describes in the 'Revue Zoologique' (No. 7, 1841, p. 217) a species of Curculio from Port Famine, which I am inclined to regard as specifically identical with specimens brought by Mr. Darwin from St. Cruz and St. Julian.

M. Guerin states that the elytra are covered above with large deep punctures arranged in longitudinal striæ, at the base of each of which is a very small tubercle, and which are united together by an indistinct transverse impression.

In the specimens brought by Mr. Darwin, the elytra are deeply punctate striate at the base, but from the base towards the apex the punctures gradually decrease in size; the minute tubercles are situated on the anterior margin of each puncture; and in addition to the striæ of punctures, the elytra are for the most part covered with somewhat irregular transverse rugæ; these are most distinct on the sides of the elytra (or rather what appears to be the side, for the elytra are strongly keeled at some little distance from the lateral margin, so that that part is hidden as we view the insect from above), less distinct on the apical portion, and do not extend to the disc. The apical portion of each elytron is slightly produced, and the elytra appear as it were terminated by a tubercle; near the apex, on each side is another tubercle. The thorax has a distinct fovea on each side, in the middle and near the lateral margin. The size of the specimens from Port St. Cruz varies from length 9½ lin., width 4⅓ lin. to length 7¼ lin., width 3⅓ lin.

A specimen from St. Julian differs in being considerably smaller and more deeply sculptured, and in having a small patch of white scales near the apex of the elytra: the interstice between the fourth and fifth striæ is somewhat raised. Length 7 lines.

In the collection is a specimen, without label, which agrees with this variety as I presume it is. Length 6½ lines.

Two out of three specimens from St. Cruz have pitchy red colour legs; in the third the legs are black. The specimen from St. Julian has also black legs.

Mr. Darwin found this Curculio "lying dead by thousands on all parts of the plains at St. Julian both far in the interior and near the coast."

MICROSCOPICAL SOCIETY.

At a meeting of the Microscopical Society held October 19th, 1842, J. S. Bowerbank, Esq., in the Chair, a paper was read by William B. Carpenter, M.D., "On the Structure of the Animal Basis of the common Egg-shell, and of the Membrane surrounding the Albumen." The author found on examining the thin membrane surrounding the albumen of the hen's egg (*membrana putaminis*) that it consisted of several laminæ, each lamina being composed of interlacing fibres, between which numerous interspaces are left: on comparing this with a portion of egg-shell decalcified by means of dilute acid, both presented the same structure, but the laminæ were more numerous in the latter; he supposes that the deposit of calcareous matter takes place in the interspaces left by the reticulation of the fibres, and concludes that this fibrous membrane is analogous to the chorion of Mammalia. A preparation showing the identity of the two structures accompanied the paper.

Another paper was also read by Arthur Hill Hassall, Esq., entitled "An Explanation of the Cause of the Rapid Decay of many Fruits, more especially of those of the Apple tribe." After some preliminary observations, the author proceeded to state that on placing a portion of decayed apple under the microscope he observed vast numbers of ramified filaments passing in all directions between and around the cells of the parenchyma of the fruit: these filaments were regarded as those of a minute fungus or fungi*, which by insinuating themselves between the cells of the pulp of the fruit, detached them from their connections with each other, destroyed their vitality and ultimately produced a decomposition of their contents.

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* Complete observations on this interesting subject have been made known by Prof. Ehrenberg so far back as 1820 in the 'Regensburger Flora,' ii. p. 53), and more fully in the 'Nova Acta Nat. Cur.' vol. x., under the title *De Mycetogenesi Epistola*.—Ed. Ann.

The author then gives his reasons for supposing the fungi to be the cause and not the effect of the decay, and concludes by describing the several stages of development of the fungi and their mode of entrance within the fruit. Specimens of the fungi were exhibited to the Society after the reading of the paper.

GEOLOGICAL SOCIETY.

Nov. 17, 1841.—A letter addressed to Dr. Fitton by Mr. Lyell and dated Boston the 15th of October, 1841, was read.

Mr. Lyell's attention between the period of his arrival in the United States and the date of his letter, had been principally devoted to the grand succession of Silurian, Devonian, and Carboniferous strata in the state of New York and on the borders of Pennsylvania, having been accompanied during a portion of his tour by the States' Geologist Mr. J. Hall; but he had also visited in company with that gentleman the Falls of Niagara and the adjacent district, and he states that he purposes to communicate a paper on the phænomena of the recession drawn from new arguments founded on the position of a fluviatile deposit below the Cataract. He expresses his intention of also communicating a notice of five localities of Mastodon bones which he had visited, digging up some remains himself, and collecting the accompanying shells, which he says, seem to have been neglected. He had likewise examined, accompanied by Prof. Silliman and his son, the new red with intrusive trap in Connecticut; and, assisted by Mr. Conrad, he had collected fossils in every member of the cretaceous system in New Jersey*. The principal object however, of the present communication is, to point out the extension to the United States of Mr. Logan's generalizations on the beds of fire-clay containing Stigmaria, formerly laid before the Society in a paper on the coal-field of South Wales. Mr. Lyell had met Mr. Logan at New York, previously to that gentleman's visit to the anthracite coal-field of Pennsylvania, and he adverts to the delight which Mr. Logan must have felt in witnessing the occurrence of beds of Stigmaria fire-clay to an extent far exceeding what could have been expected. On the confines of the states of New York and Pennsylvania Mr. Lyell found remains of Holoptychius and other fishes in the old red sandstone, and at the bottom of the overlying coal series a thick quartzose conglomerate, and he says that the coal-measures with their imbedded plants, bear an exact analogy to British coal-measures, both in detail and as a whole. In investigating the coal district of Blossberg, Mr. Lyell had for a guide Dr. Saynisch, president of the mines. The first point which they examined presented three seams of bituminous coal resting on fire-clay containing Stigmariæ, with the leaves attached to the stems and extending in all directions through the clay and they observed in a gallery lighted on purpose that the stems seen *in situ* were very nearly all parallel to the planes of stratification only one being in an oblique position Every stratum underlying a coal-seam examined by Mr Lyell, presented the same phænomena except one and in that case the bed was so sandy that it could not be considered as a fire clay The thickness of these Stigmaria deposits varied from one foot to six feet The roof of the Blossberg coal seams consists usually of bituminous slates but occasionally of very micaceous grit and it contains great varieties of ferns as well as other plants agreeing generically at least with those common in the British coal-measures

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* Mr. Lyell mentions incidentally having observed between Easton and Trenton, on the Delaware, and in 40° of north latitude, that all the trees were barked on one side, at the height of twenty-two feet above the present level of the river, owing to a freshet and stoppage by ice in the spring of 1841. The stuccoed parts of the houses were also strangely scraped; and in one place the canal, the towing path of which is twenty-two feet above the river, was so filled with gravel that carriages did not cross by the bridges.

Mr Lyell next examined the anthracitic coal district at Pottsville on the Schuylkill, in the southern part of the Alleghanies This district had been examined and described as well as modelled by Mr R C Taylor and the model had been inspected by Mr Lyell previously to his visit The whole of Pennsylvania has been mapped by Prof H D Rogers by direction of the State Legislature Mr Lyell refers to this survey and he states that by consulting Prof Rogers s map it will be found that the Alleghanies or more properly the Appalachians which viewed geologically are 120 miles broad consist of twelve or more great parallel ridges, or anticlinal and synclinal flexures having a general north-north-east and south south-west strike but in Pennsylvania a nearly east and west strike prevails The strata are most tilted on the southern border of the chain where their position is often inverted and the folds become less and less towards the central ridges and troughs which again increase in breadth the more northward their position till at last the beds are almost horizontal The oldest formations also are chiefly exposed in the most southern or disturbed regions where syenite and other plutonic rocks are intruded into the lower part of the Silurian series It has long been observed that the anthracitic coal is confined to the southern or Atlantic side of this assemblage of small parallel chains and that the bituminous occurs in the more inland or less disturbed region, the conclusion, therefore, Mr Lyell states seems inevitable that the change in the condition of the coal was a concomitant of the folding and upheaval of the rocks The conversion moreover is most complete where the beds have been most disturbed and there are tracts in Pennsylvania and Virginia near the centre of the chain, where the coal is in a semi bituminous state Chemical analysis, likewise, has shown that a gradation from the most bituminous to the most anthracitic coal may be found in crossing the chain from north to south* The associated shales, &c , of the disturbed regions exhibit no alterations

It has also been supposed that the anthracite belonged to the transition and the bituminous coal to the secondary period but this belief Mr Lyell says has been gradually abandoned, as the knowledge of the geological position and the fossil plants of the coal-districts have become better known Both the anthracitic and the bituminous coal overlie the old red sandstone and contain the same ferns, Sigillariæ, Stigmariæ, Asterophyllites &c., and they are as abundant and perfect in the anthracite as in the bituminous coal.

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* See papers by Prof H D Rogers, Dr Silliman, &c

At the first point where Mr. Lyell, accompanied by Prof. Rogers examined the Pottsville coal-measures, the strata are nearly vertical being cut off by a great fault from the less inclined beds which form the northern prolongation of the measures. They present thirteen beds of anthracite the lowest of which alternate with the uppermost strata of the coarse underlying conglomerate. The southern wall of an excavation from which the coal had been removed and which wall occupied the place of the underclay presented impressions of the stems and leaves of Stigmaria and on the more solid and slaty beds of the opposite wall, or original roof, there were leaves of Pecopteris reed-like impressions, and Calamites. In the slightly inclined northern continuation of the coal measures Mr. Lyell observed in the Peachmount vein three miles north-east of Pottsville a bed of anthracite eight feet thick overlaid by the usual roof of grey grit and underlaid by blue clay or shale with Stigmaria. Impressions of ferns were likewise noticed in the coal itself. Only one instance was met with in the Pottsville coal-district by Mr. Lyell and Prof. Rogers, of a Stigmaria placed at right angles to the plane of stratification.

The Pottsville or southern anthracitic coal field of Pennsylvania was illustrated by a section resulting from the former labours of Prof. Rogers under whose guidance Mr. Lyell examined the country. The following remarks may explain the general structure of the country, the names applied to the formations are not however, those previously employed by the American geologists but those suggested by Mr. Lyell, in conformity with the conclusions at which he arrived after his tour in New York, and a comparison of the strata of that state with their British equivalents. The contrast between the relative importance of most of the Silurian and Devonian groups in Pennsylvania and in New York Mr. Lyell states is very great arising from a larger portion of sandstones and grits in the Pennsylvanian rocks. The section extends from north of Pottsville to the country ranging immediately south of Orwigsburg. To the south of the vertical coal measures and the subjacent conglomerate there are displayed successively—1st, a vast series composed of red shales 3000 feet thick, of grey sandstone 2400 feet thick and of red sandstone 6000 feet thick, the whole being considered by Mr. Lyell as portions of the old red sandstone and 2nd of olive coloured shale containing Devonian fossils. The dip of the strata is either nearly vertical or inverted. Still further south, and a short distance north of Orwigsburg the olive-coloured shales are succeeded by very highly inclined or inverted beds of upper Silurian rocks flanking a protruded band of lower Silurian strata, and lastly, on the southern confines of the section is a trough of the Devonian olive coloured shales resting on the upper Silurian strata.

Beautiful exhibitions of the underclay with its associated plant and of the overlying roof with its distinct remains were observed by Mr. Lyell and Prof. Rogers at Tamaqua, in the southern coal-field

The thinning out of the grits and conglomerates of the west causes the beds of anthracite to be brought more nearly together in this district, and Mr. Lyell says the decrease in the thickness of the intervening strata prepares the observer for the union of several of the seams still farther east, and for the enormous thickness of the anthracite at various places near the village of Mauch Chunk or Bear Mount, particularly at the well-known Lehigh Summit Mines. At this point a mass of anthracite forty feet thick, deducting three intercalated fire clays and a fine thin vein of impure coal, is quarried in open day, a covering of forty feet of sandstone being entirely removed. In the south mine where there is a sharp anticlinal fold in the coal, the Stigmaria clay, four feet thick, was well seen, with nearly forty feet of coal above it and four below. In the Great mine Mr. Lyell observed the following section:—

Top yellow quartzose grit.	
Coal, two or three inches of the uppermost part of the bed being in the state of dust, as if they had been crushed or rubbed by the yellow quartzose grit	5 feet
Blue fire-clay with Stigmariæ	15 inches
Coal, including two or three seams of an impure slaty nature	25 feet
Blue fire clay with Stigmariæ	2 feet
Coal, with an intervening layer of hard bituminous slate	8 feet

The anthracite, as in other parts of these coal-measures, often exhibits a texture exactly like that of charcoal, and frequently impressions of striated leaves, exactly resembling, as pointed out by Prof. Rogers, those of liliaceous plants, particularly the iris.

Mr. Lyell, accompanied by Prof. Rogers, afterwards examined the Room Run mines, on the Nesquahoning, where he saw a splendid exhibition of Stigmariæ in a bottom clay, one stem, about three inches in diameter, being no less than thirty five feet in length. In the roof of slaty sandstone were impressions of Pecopteris, Glossopteris, and other ferns.

At Beaver Meadow, or the middle coal field, a bed of anthracite is overlaid as well as underlaid by Stigmaria blue clay; the upper fire clay however soon thins out and is replaced by sandstone. No coal rested upon it, but Mr. Lyell observes that the carpeting of coal may not be always large enough to cover the flooring of fire-clay, or some change of circumstances or denudation may have interfered with the usual mode of deposition. Upon the whole Mr. Lyell says, the accumulation of mud and Stigmariæ was in Pennsylvania as in South Wales, the invariable forerunner of the circumstances attending the production of the coal-seams. The two extreme points at which he observed the Stigmaria clay, Blossberg and Pottsville, are about 120 miles apart in a straight line, and the analogy of all the phænomena at those places, and still more on both sides of the Atlantic, is, he says, truly astonishing. In conclusion, Mr. Lyell states, that he had just received a letter from Mr. Logan announcing the existence of the bottom clay, with Stigmariæ, in Nova Scotia, and that Mr. Logan had visited Mauch Chunk.

Dec 11 —A paper was read containing a ' Description of the Remains of Six Species of Marine Turtles (*Chelones*) from the London Clay of Sheppey and Harwich " By Richard Owen Esq F R S , F G S , Hunterian Professor in the Royal College of Surgeons

The author commences by quoting the generalizations given in the latest works which treat of Fossil Chelonians and examines the evidence on which those from the Eocene clay of Sheppey had been referred exclusively to the freshwater genus *Emys* by Cuvier and others and he points out the circumstances which invalidate the conclusions that had been deduced from it He then proceeds to describe the fossils and to show the characters by which he has established the existence of five species of marine turtles from the London Clay at Sheppey, and a sixth species from the same formation near Harwich

1 *Chelone breviceps* —The first species, found at Sheppey, is called by the author *Chelone breviceps* and its unequivocal marine nature was recognised by a nearly perfect cranium wanting only the occipital spine and presenting a strong and uninterrupted roof extended from the parietal spine on each side over the temporal openings the roof being formed chiefly by a great development of the posterior frontals Further evidence of its marine origin exists in the large size and lateral aspect of the orbits their posterior boundary extending beyond the anterior margin of the parietals also in the absence of the deep emargination which separates the superior maxillary from the tympanic bone in freshwater tortoises especially the *Emys expansa*

In general form the skull resembles that of the *Chelone Mydas* but it is relatively broader the anterior frontals are less sloping and the anterior part of the head is more vertically truncate the median frontals also enter into the formation of the orbits in rather a larger proportion than in *C Mydas* In *Chelone imbricata* they are wholly excluded from the orbits

The trefoil shape of the occipital tubercle is well marked the laterally expanded spinous plate of the parietal bones is united by a straight suture to the post frontals along three-fourths of its extent and for the remaining fourth with the temporal or zygomatic element

These proportions are reversed in the *Emys expansa*, in which the similarly expanded plate of the parietals is chiefly united laterally with the temporal bones In other freshwater tortoises the parietal plate in question does not exist

The same evidence of the affinity of the Sheppey Chelonite in question to the marine turtles is afforded by the base of the skull — the basi occipital is deeply excavated , the processes of the pterygoids which extend to the tympanic pedicles are hollowed out lengthwise the palatal processes of the superior maxillary and palatine bones are continued backwards to the extent which characterizes the existing Cheloniæ , and the posterior or internal opening of the nasal passages is in a proportional degree carried further back in the mouth The lower opening of the zygomatic spaces is wider in the Sheppey Chelonite than in the *Emys expansa*

The external surface of the cranial bones in the fossil is broken by small irregular ridges, depressions and vascular foramina, which give it a rough shagreen-like character.

The lower jaw, which is preserved in the present fossil, likewise exhibits two characters of the marine turtles; the dentary piece, *e. g.* forms a larger proportion of the lower jaw than in land or fresh-water tortoises. The under part of the symphysis, which is not larger than in *Chelone Mydas*, is slightly excavated in the fossil.

In the rich collection of Sheppey fossils belonging to Mr. Bowerbank, there is a beautiful Chelonite including the carapace, plastron, and the cranium, which is bent down upon the forepart of the plastron, and which, though mutilated, displays sufficient characters to establish its specific identity with the skull of the *Chelone breviceps* just described. The outer surface of the carapace and plastron has the same finely rugous character as that of the cranium, in which we may perhaps perceive a slight indication of the affinity with the genus Trionyx.

The carapace is long, narrow, ovate, widest in front and tapering towards a point posteriorly; it is not regularly convex, but slopes away like the roof of a house from the median line, resembling in this respect and its general depression the carapace of the turtle. There are preserved eleven of the vertebral plates, the two last alone being wanting. The eight pairs of expanded ribs are also present, with sufficient of the narrower tooth-like extremities of the six anterior pairs to determine the marine character of the fossil, which is indicated by its general form. Other minute characters are detailed, and a comparison with the Chelonite from the tertiary beds near Brussels figured by Cuvier is instituted.

The sternum of the *Chelone breviceps*, although more ossified than in existing Chelonia, yet presents all the essential characters of that genus. There is a central vacuity left between the hyosternals and hyposternals, but these bones differ from those of the young Emys in the long pointed processes which radiate from the two anterior angles of the hyosternals, and the two posterior angles of the hyposternals.

The xiphisternals have the slender elongated form and oblique union by reciprocal gomphosis with the hyposternals which is characteristic of the genus Chelone.

The posterior extremity of the right episternal presents the equally characteristic slender pointed form.

With these proofs of the sternum of the present fossil being modified according to the peculiar type of the marine Chelones, there is evidence, however, that it differs from the known existing species in the more extensive ossification of the component pieces; thus the pointed rays of bone extend from a greater proportion of the margins of the hyo- and hyposternals, and the intervening margins do not present the straight line at right angles to the radiated processes.

In the *Chelone Mydas*, for example, one half of the external margin of the hyo- and hyposternals where they are contiguous are straight, and intervene between the radiated processes, which are developed from the remaining halves; while in the *Chelone breviceps* about a sixth part only of the corresponding external margins are similarly free and there form the bottom not of an angular, but a semicircular interspace

The radiated processes from the inner margins of the hyo- and hyposternals are characterized in the *Chelone breviceps* by similar modifications but their origin is rather less extensive they terminate in eight or nine rays shorter and with intervening angles more equal than in existing Chelones The xiphisternal piece receives in a notch the outermost ray or spine of the inner radiated process of the hyposternal as in the Chelones and is not joined by a transverse suture as in the Emydes, whether young or old

The characters thus afforded by the cranium, carapace plastron, and some of the bones of the extremity prove the present Sheppey fossil to belong to a true sea turtle and at the same time most clearly establish its distinction from the known existing species of Chelone from the shortness of the skull especially of the facial part as compared with its breadth the author proposes to name this extinct species *Chelone breviceps*

2 *Chelone longiceps* — The second species of Sheppey turtle called *Chelone longiceps* is founded upon the characters of the cranium carapace and plastron The cranium differs more from those of existing species by its regular tapering into a prolonged pointed muzzle, than does that of the *Chelone breviceps* by its short and truncated jaws

The surface of the cranial bones is smoother and then other modifications prove the marine character of the fossil as strongly as in the *Chelone breviceps*

The orbits are large the temporal fossæ are covered principally by the posterior frontals and the exterior osseous shield completely overhangs the tympanic and ex occipital bones The compressed spine of the occiput is the only part that projects further backwards

The palatal and nasal regions of the skull afford further evidence of the affinities of the present Sheppey Chelonite to the Turtles The bony palate presents in an exaggerated degree its great extent from the intermaxillary bones to the posterior nasal aperture, and it is not perforated as in the Trionyxes, by an anterior palatal foramen

The extent of the bony palate is relatively greater than in the *Chelone Mydas* the trenchant alveolar ridge is less developed than in the *Chel Mydas*, the groove for the reception of that of the lower jaw is shallower than in the existing Cheloniæ, or the extinct *Chel breviceps* arising from the absence of the internal alveolar ridge

The present species is distinguished by the narrowness of the sphenoid at the base of the skull and by the form and groove of the pterygoid bones, from the existing Cheloniæ, and *à fortiori* from the Trionyxes, to which, however it approaches in the elongated and pointed form of the muzzle and the trenchant character of the alveolar margin of the jaws

The general characters of the carapace are next given, and a specimen from Mr Bowerbank s collection is more particularly described

This carapace, as compared with that of the *C breviceps* in the same collection, presents the following differences it is much broader and flatter: the vertebral plates are relatively broader, the lateral angle, from which the intercostal suture is continued, is much nearer the anterior margin of the plate, the *C. longiceps* in this respect resembling the existing species: the expanded portions of the ribs are relatively longer, they are slightly concave transversely to their axis on their upper surface, while in *C. breviceps* they are flat. The external surface of the whole carapace is smoother, and although as depressed as in most turtles, it is more regularly convex and sloping away by two nearly plane surfaces from the median longitudinal ridge of the carapace.

Among the minor differences of the two Sheppey fossils the author states, that the first vertebral plate of *C. longiceps* is more convex at its middle part, and sends backwards a short process to join the second vertebral plate, in which it resembles the *C. Mydas*. The second plate is six sided, the two posterior lateral short sides being attached to the second pair of ribs, in which the present species differs from both *C. Mydas* and *C. breviceps*. The third vertebral plate is quadrangular instead of the second, as in *C. breviceps* and *C. Mydas*. The impressions of the epidermal scutes are deeper, and the lines which bound the sides of the vertebral scutes meet at a more open angle than in the *C. breviceps*, in which the vertebral scutes have the more regular hexagonal form of those of the *C. Mydas*.

The plastron is more remarkable than that of the *C. breviceps* for the extent of its ossification, the central cartilaginous space being reduced to an elliptical fissure. The four large middle pieces, called hyosternals and hyposternals, have their transverse extent relatively much greater as compared with their antero-posterior extent than in *C. breviceps*. The median margins of the hyosternals are developed in short toothed processes along their anterior two thirds, and the median margins of the hyposternals have the same structure along their posterior halves.

The xiphisternals are relatively broader than in *C. breviceps* or in any of the existing species, and are united together by the whole of their median margins. The entosternal piece is flat on its under surface.

Each half of the plastron is more regularly convex than in *C. Mydas*. The breadth of the sternum along the median suture, uniting the hyosternals and hyposternals, is five inches, and the breadth at the junction of the xiphisternals with the hyposternals is two inches.

The posterior part of the cranium is preserved in this fossil withdrawn beneath the anterior part of the carapace, the fracture shows the osseous shield covering the temporal fossæ, and the pterygoids remain, exhibiting the wide and deep groove which runs along their under part.

It has been most satisfactory, the author says, to find that the two distinct species of the genus Chelone, first determined by the skulls only, should thus have been established by the subsequent observation of their bony cuirasses, and that the specific differences manifested by the cuirasses should be proved by good evidence to be characteristic of the two species founded on the skulls.

Thus the portion of the skull preserved with the carapace first described served to identify that fossil with the more perfect skull of the *Chelone breviceps*, by which the species was first indicated And, again, the portion of the carapace adhering to the perfect skull of the *Chelone longiceps* equally served to connect with it the nearly complete osseous buckler which otherwise from the very small fragment of the skull remaining attached to it, could only have been assigned conjecturally to the *Chel longiceps* an approximation which would have been the more hazardous, since the *Chel breviceps* and *Chel longiceps* are not the only turtles which swarm those ancient seas that received the enormous argillaceous deposits of which the isle of Sheppey forms a part

3 *Chelone latiscutata* —A considerable portion of the bony cuirass of a young turtle from Sheppey, three inches in length including the 2nd to the 7th vertebral plates with the expanded parts of the first six pairs of ribs and the hyosternal and hyposternal elements of the carapace, most resembles that of the *Chelone conιceps* in the form of the carapace, and especially in the great transverse extent of the above-named parts of the sternum it differs however from the *Chel longiceps* and from all the other known Chelonites in the great relative breadth of the vertebral scutes, which are nearly twice as broad as they are long

The central vacuity of the plastron is subcircular and as might be expected from the apparent nonage of the specimen, is wider than in the *Chel longiceps* but the toothed processes given off from the inner margin of both hyo- and hyposternals are small, subequal regular in their direction, and thus resemble those of the *Chel longiceps*

The length of the expanded part of the third rib is one inch seven lines, its antero-posterior diameter or breadth, six lines in the form of the vertebral extremities of the ribs and of the vertebral plates to which they are articulated the present fossil resembles the *Chel longiceps*

The author knows of no recent example, however of the Chelone that offers such varieties in the form of its epidermal scutes as would warrant the present Chelonite being considered a variety merely of the *Chel longiceps*, and he therefore indicates the distinct species which it seems to represent, by its main distinctive character, under the name of *Chelone latiscutata*

4 *Chelone convexa* —The fourth species of Chelone indicated by a nearly complete cuirass from Sheppey holds a somewhat intermediate position between the *C breviceps* and *C longiceps*, the carapace being narrower and more convex than that of *C conιceps* broader, and with a concavity arising from a more regular curvature than in *C breviceps* The expanded parts of the ribs have an intermediate length with those of the two Chelones with which this specimen is compared, and therefore is a difference independent of age

The distinction of *C convexa* is still more strikingly established in the plastron which in its defective ossification more nearly resembles that of the existing species of Chelone All the bones especially the xiphisternals, are more convex on their outer surface than in other turtles, recent or fossil The internal rays of the hyosternals are divided into two groups, the lower consisting of two short and strong teeth projecting inwards, while the rest extend forwards along the inner side of the episternals. The same character may be observed in the corresponding processes of the hyposternals, but the external process is relatively much narrower than in *C. breviceps.* The following differences are stated to distinguish the sternum of *C. convexa* from that of *C. Mydas.* The median margin of the hyosternals forms a gentle curve, not an angle; that of the hyposternals is likewise curved, but with a slight notch. The longitudinal ridge on the external surface and near the median margin of the hyo- and hyposternals is less marked in the Sheppey fossil, especially in the hyposternals, which are characterized by a smooth concavity in their middle.

The suture between the hyo- and hyposternals is nearer to the external transverse radiated process of the hyposternals. The median vacuity of the sternal apparatus is elliptical in the *Chel. convexa*, but square in the *Chel. Mydas.*

The characteristic lanceolate form of the episternal bone in the genus Chelone is well seen in the present fossil.

The true marine character of the present Sheppey Chelonite is likewise satisfactorily shown in the small relative size of the entire femur, which is preserved on the left side, attached by the matrix to the left xiphisternal. It presents the usual form, a slight sigmoid flexure, characteristic of the Chelones; it measures one inch in length. In an Emys of the same size the femur, besides its greater bend, is $1\frac{1}{2}$ inch in length.

5. *Chelone subcristata.*—The fifth species of Chelone from Sheppey distinguishable by the characters of its carapace approaches more nearly to the *Chelone Mydas* in the form of the vertebral scutes, which are narrow in proportion to their length, than in any of the previously described species; but is more conspicuously distinct by the form of the 6th and 8th vertebral plates, which support a short, sharp longitudinal crest. The middle and posterior part of the first vertebral plate is raised into a convexity, as in the *Chel. longiceps,* but not into a crest.

The keeled structure of the sixth and eighth plates is more marked than in the fourth and sixth plates of *Chelone Mydas,* which are raised into a longitudinal ridge.

The characters of the carapace are then minutely described.

Sufficient of the sternum is exposed in the present fossil to show, by its narrow elongated xiphisternals, and the wide and deep notch in the outer margin of the conjoined hyo- and hyposternals, that it belongs to the marine Chelones.

The xiphisternals are articulated to the hyposternals by the usual notch or gomphosis; they are straighter and more approximated than in the *Chel. Mydas*; the external emargination of the plastron differs from that of the *Chel. Mydas* in being semicircular instead of angular; the *Chel. subcristata* approaching, in this respect, to the *Chel. breviceps.*

The shortest antero-posterior diameter of the conjoined hyo- and hyposternals is two inches seven lines. The length of the xiphisternal two inches six lines. The breadth of both across their middle part, one inch three lines.

The name proposed for this species indicates its chief distinguishing character, viz. the median interrupted carina of the carapace, which may be presumed to have been more conspicuous in the horny plates of the living animal than in the supporting bones of the fossilized carapace.

6. *Chelone planimentum*.—This species is founded on an almost entire specimen of skull and carapace of the same individual, in the museum of Prof. Sedgwick; on a skull and carapace belonging to different individuals in the museum of Prof. Bell; and on a carapace in the British Museum; all of which specimens are from the London clay at Harwich.

The skull resembles, in the pointed form of the muzzle, the *Chel. longiceps* of Sheppey, but differs in the greater convexity and breadth of the cranium, and the great declivity of its anterior contour.

The great expansion of the osseous roof of the temporal fossæ, and the share contributed to that roof by the post-frontals, distinguish the present equally with the foregoing Chelonites from the fresh-water genera Emys and Trionyx. In the oblique position of the orbits and the diminished breadth of the interorbital space, the present Chelonite however approaches nearer to Trionyx and Emys than the previously described species.

Its most marked and characteristic difference from all existing or extinct Chelones is shown by the greater antero-posterior extent and flatness of the under part of the symphysis of the lower jaw, whence the specific name here given to the species.

Since at present there is no means of identifying the well-marked species of which the skull is here described with the Chelonite figured in the frontispiece to Woodward's 'Synoptical Table of British Organic Remains,' and alluded to without additional description or characters as the *Chelonia Harvicensis* in the additions to Mr. Gray's 'Synopsis Reptilium,' p. 78, 1831, and since it is highly probable that the extensive deposit of Eocene clay along the coast of Essex, like that at the mouth of the Thames, may contain the relics of more than one species of our ancient British turtles, the author prefers indicating the species here described by a name having reference to its peculiarly distinguishing character, to arbitrarily associating the skull with any carapace to which the vague name of *Harvicensis* has been applied.

Besides the specimen of Chelonite from Harwich in the museum of Norwich, figured by Woodward, there is a mutilated carapace of a young Chelone from the same locality in the British Museum. This specimen exhibits the inner side of the carapace with the heads and part of the expanded bodies of four pairs of ribs. It is not sufficiently entire to yield good specific characters, but it demonstrates unequivocally its title to rank with the marine turtles. It is figured in Mr. Kœnig's 'Icones Sectiles,' pl. xvi. fig. 192, under the name of *Testudo plana*.

The carapace of a larger specimen of Chelone, from the coast of Harwich, was purchased, by the British Museum, of Mr. Charles-worth, by whom a lithograph of the inner surface of this Chelonite, of the natural size has been privately distributed, without description.

The carapace in the museum of Prof. Sedgwick, forming part of the same individual (*Chelone planimentum*) as the skull above described, exhibits many points of anatomical structure more clearly than the last-mentioned Chelonite in the British Museum; it also displays the characteristic coracoid bone of the right side in its natural relative position. The resemblance of this carapace in general form to that of the *Chelone caretta* is pretty close; it differs from that and other known existing turtles, and likewise from most of the fossil species in the thickness and prominence of the true costal portions of the expanded vertebral ribs, which stand out from the under surface of the plate through their entire length, and present a somewhat angular obtuse ridge towards the cavity of the abdomen.

In the large proportional size of the head the *Chelone planimentum* corresponds with the existing turtles; and that the extinct species here described attained larger dimensions than those given above is proved by a fossil skull from the Harwich clay, in the collection of Prof. Bell, which exhibits well the character of the broad and flattened symphysis.

A carapace of a smaller individual of *Chelone planimentum* from the Harwich coast, with the character of the inwardly projecting ribs strongly marked, is likewise preserved in the choice collection of the same excellent naturalist. One of the hyosternal bones enclosed in the same nodule of clay testifies to the partial ossification of the plastron in this species.

In the summary of the foregoing details the author observes, that they lead to conclusions of much greater interest than the previous opinions respecting the Chelonites of the London basin could have originated. Whilst these were supposed to have belonged to a fresh-water genus, the difference between the present fauna and that of the Eocene period in reference to the Chelonian order was not very great; since the *Emys* or *Cistudo Europæa* still abounds on the Continent and lives long in our own island in suitable localities: but the case assumes a very different aspect when we come to the conviction, that the majority of the Sheppey Chelonites belong to the true marine genus Chelone, and that the number of species of the Eocene extinct turtles already obtained from so limited a space as the isle of Sheppey exceeds that of the species of existing Chelone.

Notwithstanding the assiduous search of naturalists, and the attractions to the commercial voyager which the shell and the flesh of the turtles offer, all the tropical seas of the world have hitherto yielded no more than five well defined species of Chelone, and of these only two, as the *C. Mydas* and *C. caretta*, are known to frequent the same locality.

The indications which the Sheppey turtles afford of the warmer climate of the latitude in which they lived, as compared with that which prevails there in the present day, accord with those which all the organic remains of the same depositary have hitherto yielded in reference to this interesting point.

That abundance of food must have been produced under such influences cannot, Mr. Owen states, be doubted; and he infers, that to some of the extinct species—which, like the *C. coniceps* and *C. platygnathus*, exhibit either a form of head well adapted for penetrating the soil, or with modifications that indicate an affinity to the Trionyxes—was assigned the task of checking the undue increase of the extinct crocodiles of the same epoch and locality by devouring their eggs or their young, becoming probably in return themselves an occasional prey to the older individuals of the same carnivorous saurian.

MISCELLANEOUS.

RESULTS OF DEEP DREDGING.

To the Editors of the Annals of Natural History.

GENTLEMEN,—Observing my name in connection with an article in your Magazine of last month, showing the results of deep dredging off the Mull of Galloway, I am induced to trouble you with a few remarks as to those results.

The depths mentioned in that article are, I believe, far greater than any which had been previously explored on the British coast. My own experience (which has been very considerable) has not enabled me to obtain the result of any greater depth than 50 fathoms. But I was somewhat disappointed on perusing the article to observe such a scanty list of rariora, and total absence of novelties, where such discoveries might have been well looked for, and also at the rare occurrence of living specimens. The species which appear to be peculiar to the west and north coasts of Scotland, and all of which I noticed in my list of Oban shells (viz. the *Trichotropis acuminatus*, *Pecten niveus* and *Astarte semisulcata*), appear to be wanting at the depths and locality explored by Capt. Beechey, besides the *Pecten aculeatus*, which has been also dredged off the Isle of Arran and in Cork Harbour. The *Trochus elegans* in my list of Oban shells (named *millegranus* in your Magazine) has been obtained by me from seven or eight different localities in Scotland and Ireland, and I this autumn procured it abundantly by dredging off Fishguard on the Pembrokeshire coast. *Nucula minuta* and all the three species of *Lima* have been found on different parts of the English coast. *Eulima Donovani* (*E. polita* of British authors, but not of Risso, who first published the name,) was found by me to be not uncommon in the Shetland Isles.

Nothing at present occurs to me with reference to the recorded results of dredging obtained by my friend Mr. Forbes, as I presume his researches were instituted principally with a view to elucidate certain geological principles.

I take this opportunity of observing that the *Eulima decussata* (n. s.) in my list of Oban shells had been previously found at Exmouth by Mr. Clark, who named it '*Pyramidella Jeffreysii*,' and this autumn by myself at Fishguard. The *E. crassula* in the same list has not, as far as I can learn, been obtained from any other locality. The *Corbula rostrata* in the same list had been, it seems, previously published by Capt. Brown under the name of *Anatina rostrata*, and Mr. Gray has proposed for it the new generic name of *Neæra*.

I am, Gentlemen, your faithful servant,

10th October, 1842. J. GWYN JEFFREYS, F.R. & L.SS.

Description of a new species of Thracia By C B Adams

Thracia inequalis T testa fragili per-inequilaterali, per-inequivalvi, irregulariter striata, postice truncata, valva sinistra subplanulata, altera per-convexa, callo nymphali cochleariformi, anterius elongato, ossiculo lunato, semicirculari

Shell white, very thin, before broadly and behind narrowly truncate very inequilateral and inequivalve much deflected to the left anteriorly with the striæ of growth unequal numerous and crowded at the extremities, where, under a magnifier the surface appears shagreened by minute wrinkles of the striæ *epidermis* very thin, brownish, thicker at the extremities *left valve* nearly flat, with five obtuse angles radiating from the beak *right valve* much larger and very convex, emarginate in the whole of the posterior truncation, with a groove and elevated umbonal angle defining the areolar region its inferior margin sinuous, *beaks* small pointed, lamelliform the right one moderately excavated for the reception of the other, ***nymphæal callosities*** spoon shaped very much produced forwards and inwards, *ossiculum* semicircular and lunate, with an impression on the centre of each side, but much deeper on one side situated between the spoon shaped apophyses and the dorsal margin

Dimensions —Length 1 2 inch height 75 inch, width 45 inch length of ossiculum 1 inch* *Hab* Gulf of Mexico

Remarks —A single specimen of this interesting species was presented to the cabinet of this college by the Rev Wm I Hamilton of Mobile Ala It is remarkable for the disparity of the valves the irregularity of its form and the sharp lamelliform beaks —*From Silliman s American Journal for July* 1842

BIRDS OF KENT

Mr Mummery of Margate sends us the following notices of birds which have lately been met with by him in and near the Isle of Thanet

Sept 29 near Reculvers having just shot several red starts, *Sylvia Phœnicurus*, he observed a small bird not unlike a female redstart and having shot it found it to be a very fine female blue-throated warbler *Sylvia suecica* only two instances of the occurrence of which are recorded by Mr Yarrell It is placed in the Margate Museum A very fine adult male hen harrier *Buteo cyaneus*, has just been received, shot by W Mockett Esq, of Sandwich, and presented by him to the museum Sept 9 near Reculvers *Scolopax major*, very large weighing half a pound and half an ounce About the middle of September several specimens of the spotted crake A great number of the common gannet have made their appearance as usual at this season These birds pay us a regular visit with the herrings, following them for food I have known several to be picked up along the coast either dead or in a stupid state

'This autumn,' Mr Mummery adds ' we have had very few terns, in fact, I never knew so few The common tern used to breed rather plentifully along the coast between Margate and Reculvers but within these ten years they have abandoned the beach altogether, and betaken themselves to better quarters about Lydd near Romney The lesser tern I have formerly obtained pretty plentifully about Sandwich flats but this autumn I have not seen one I do not know how to account for their non appearance

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* The ossiculum is enlarged about 2½ linear diameters

The common gull black-headed gull Kittiwake gull and herring gull are very abundant, appearing in immense flights intermixed with the great black backed gull This last is a beautiful and noble bird, but very difficult to get a shot at Of the herring-gull a few pairs breed every year about the high cliffs at St Margaret s, near Dover as well as the common or foolish guillemot the young affording fine sport for the visitors about September

The glaucous gull and the lestris I have noticed in your Magazine before Two beautiful specimens of Leach s petrel have been taken they are in our museum One of them was found near Margate, the other near St Nicholas about seven miles from thence the first was found alive and was secured without any difficulty These birds often visit our coast in rough windy weather as well as the stormy petrel the last being more plentiful They are often brought to me alive by sailor boys who when they find them set up a-hallooing with all their might the bird then is soon caught, running anywhere for security

No 8 Cecil street, Margate S MUMMERY

METEOROLOGICAL OBSERVATIONS FOR SEPTEMBER 1842

Chiswick —September 1 Constant rain temperature increasing towards night 2 Overcast sultry 3 Overcast clear 4 Cloudy and fine 5 Foggy very fine 6 Very fine clear 7 Slight fog fine 7—10 P M violent thunder storm, much sheet- and sometimes forked lightning heavy rain, with some hail clear at night 8 Boisterous, with heavy rain 9 Rain cloudy 10 Showery 11—15 Very fine 16 Foggy fine 17 Cloudy rain 18 Fine, with slight haze rain 19 Cloudy showers 20 Showery 21 Cloudy and fine clear 22 Foggy cloudy and fine slight rain 23 Overcast heavy rain 24 Rain overcast 25 Slight showers stormy, with rain at night 26 Heavy clouds and showers clear 27 Overcast stormy and wet 28 Fine 29 Clear boisterous with rain 30 Clear and fine light rain Mean temperature of the month 0 47 above the average

Boston —Sept 1 Cloudy rain early A M 2—5 Fine 6 Cloudy 7 Fine rain, with thunder and lightning at night 8 Cloudy 9 Cloudy rain early A M rain P M 10 Cloudy rain early A M rain P M with thunder and lightning 11 Cloudy 12 Cloudy rain early A M 13 Fine 14—16 Cloudy 17 Fine rain P M 18, 19 Cloudy rain early A M 20 Fine 21 Cloudy 22 Rain 23 Rain rain early A M rain P M 24 Fine 25 Cloudy rain early A M 26, 27 Cloudy 28 Stormy rain early A M 29 Rain and stormy rain early A M 30 Cloudy rain early A M

Sandwick Manse Orkney —Sept 1 3 Showers 4 Showers cloudy 5 Bright rain 6 Rain clear 7 Damp clouds 8 Rain 9 Cloudy rain 10 Clear aurora 11 Bright fog 12 Bright cloudy 13 Drizzle cloudy 14, 15 Bright cloudy 16 Cloudy drop 17 Cloudy clear 18 Bright clear 19 Cloudy rain 20 Cloudy 21 Rain clear 22 Rain drizzle 23 Damp drizzle 24 Cloudy 25 Bright cloudy 26 Cloudy showers 27 Bright cloudy 28, 29 Cloudy clear 30 Cloudy

Applegarth Manse, Dumfries shire —Sept 1 Very wet morning 2 Fair but cloudy 3 Rain P M 4 Fine and fair 5 Thick rain A M 6 Fair but cloudy 7 Fair and fine 8 Heavy rain early A M 14 Cloudy and moist 15, 16 Fair but cloudy 17 Rain A M 18 Fair and fine lightning 19 Fair and fine thunder 20 Fair and fine 21 Fair and fine thunder 22 Fair and fine till P M rain 23 Rain early A M 24 Rain 25—28 Fair and cool 29 Fair and cool a few drops 30 Fair and cool

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr Roberton *by* Mr Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London, by* Mr Veall, *at* BOSTON, *by the* Rev W Dunbar *at Applegarth Manse*, DUMFRIES SHIRE, *and by the* Rev C Clouston, *at Sandwick Manse*, ORKNEY

Days of Month	Barometer								Thermometer										Wind					Rain					Dew point
	London Roy Soc	Chiswick		Boston	Dumfries-shire		Orkney Sandwick		London R S			Chiswick		Boston	Dumfries-shire		Orkney Sandwick		London R S 9 a m	Chiswick 1 p m	Boston	Dumfries-shire	Orkney Sandwick	London R S 9 a m	Chiswick	Boston	Dumfries-shire	Orkney Sandwick	Lond R S 9 a m
1842 Sept	9 a m	Max	Min	8½ a m	9 a m	9 p m	9¼ a m	8¾ p m	Fahr 9 a m	Self reg Mx	Self reg Min	Max	Min	8½ a m	Max	Min	9¼ a m	8¾ p m											
1	30 034	30 003	29·902	29 44	29 68	29·78	29·74	29 62	58 5	62 0	55 0	69	58	55	65	44	54	56	s	sw	nw	w	s	100	46	1		43	57
2	30·170	30·17	30 07	29 50	29 90	29 99	29 70	29 69	68 7	70 5	58 0	81	55	68	66	61	57	54	nrw	w	w	w	w	311				11	64
3	30·286	30·203	30 153	29 5	30 00	30 02	29 08	30 15	62 5	76 0	60 4	74	53	68	63½	55	54	49	nw	w	w	w	e					23	63
● 4	30·274	30 197	30 133	29 60	30 1	30 14	30 10	30·20	61 3	70 0	57 3	71	41	63	66	47	60	50	sw	nw	calm		w		·11				62
5	30 263	30 196	30 036	29 63	30 0	29 85	30 13	29 05	61 7	70 9	56 1	74	47	61	60½	41	34	11	se	s	calm	w	e					16	61
6	30 008	30 075	29·942	29 35	29·80	29 83	30 81	29 40	64 1	71	57 0	73	46	63	63	45	5	53½	s e	w	calm	w	w					36	60
7	29 928	29 880	29 127	29·37	29·74	29·50	29 35	29·65	62 1	70 3	51 8	73	55	60	64	4	58	55	e	e	calm	s	w		22		0·8	11	59
8	29 406	29 616	29 396	28 79	29 34	29 35	29 2	29 10	63 1	70 4	61 3	62	51	61	63	3	55	5		w	w	ene	se	583	64	1			62
9	29 574	29 59	29 427	28 98	29 24		29 35	29 4	60 7	60 0	51 6	60	53	57 5	61½	49½	6	55	s	w	sw		w	544	66	06		2	59
10	29 459	29 57	29 385	28·6			29 40	29 61	60 7	67 1	56 3	60	51	60 5		4	58	51	w var	w	w		ne	022	0	25		25	59
☽ 11	29 720	29 683	29 055	29 13			29 6	29	50 6	6 0	5	67	53	54			55	55	w	w	nw			052		12			57
12	29·844	29 930	29·788	29 28			29 65	29 90	60	59 9	56 2	68	45	57			6	52	nw	n	w		w			04			57
13	30 144	30 126	30 071	29 60			29 07	30·10	59 0	6 4	2 4	63	51	5			56	55	n	ne	n								58
14	30 234	30 107	30 119	29 67		30 10	30 14	30 20	62 0	69 6	55 0	7	3	62	64		61	55	n	ne	calm	wnw	w						59
15	30 216	30 144	30 101	29 66	30 07	29 97	30·10	30 03	61 5	71 0	57 2	74	45	67	65	5	61	57½	n	e	calm	w	se				0·37		69
16	30·150	30 097	29 918	29 55	29·92	29 80	29 91	29 84	55 3	69 3	54 5	72	43	61	65	5	60	57	e	e	calm	w	se						59
17	29·832	29·787	29·720	29 26	29 51	29 58	29 51	29 55	65 7	64 3	50 2	74	51	65	63½	5	54	53	e	e	s	sw	se		20				60
18	29 810	29 75	29·611	29 22	29 63	29·04	29 6	29 52	55	71 0	51 4	6	45		64	44	1	46½	n	se	calm	s	sw	201	10	22			59
○ 19	29·644	29 583	29·513	29 07	29 16	29 10	29 64	29 49	61 0	65 4	52 4	64	31	56	63	40	53	50	s	s	calm	e	ne	205	18	18			59
20	29 570	29 523	29 47	29 04	29 35	29 41	29	29 03	55 7	6 4	50 0	61	40	55	63	47	52	50½	sw	sw	calm	e-e	ne	033	02			56	55
21	29 534	29 404	29·156	29 05	29 13	29 48	29 35	29 60	57 7	64 3	49 7	60	35	57	59	44½	51	48½	w	w	calm	ne	n	063	02			31	54
22	29 528	29 404	29·460	29 06	29 19	29 42	29 05	29·64	49 5	62 2	44 4	60	42	48	59	42½	50	54	w	w	calm	n	n		·01		0 20	05	52
23	29·534	29 491	29 346	29 06	29 40	29 47	29·73	29 70	5 3	59 7	40 7	56	47	50	6	47½		1	s	nw	nw	ne	ne		36	05		13	51
24	29·400	29 144	29·341	29 03	29 45	29 52	29 85	29 86	52 4	58 4	45 0	59	52	57	5	47	50	45	e	ne	e	ne	n	·630	06	1 15			58
25	29·580	29 612	29 536	29 12	29 67	29 98	29 90	30 11	55 7	57 8	49	6	51	54	5	48	49	47½	n	ne	calm	ne	n	111	26	02			54
26	29 666	29 906	29 745	29 35	29 99	30 10	30	30 2	57 0	62 7	0	67	40	5	57	49	40	51	n	e	calm	ne	n	338	·08			3	55
☾ 27	29·934	29 929	29 8 9	29 45	30 10	30 12	30 3	30 3		63 0		55	49	59	57	43	52	48	nne	ne	e	ne	n	058	27				50
28	30 110	30 053	30 0 7	29·50	30 24	30 24	30 6	30 5		61 2	59 0	58	45	54	53½	45	48		n	ne	e	n	ne	298		03			50
29	30 080	30 0 3	30 026	29 00	30 33	30 3	30	30 56	53 5	55	41 6	55	4	52	5	42	51	43	ne ai	ne	e	ene	e		04	22			49
30	30·208	30 150	30 139	29·72	30·32	30 27	30 4	30 40	52 3	50 3	47 5	57	41	53	57	41	53	50	ne	ne	calm	ne	w		·01	26	0 13		47
Mean.	29 881	29 861	29 765	29 31	29 71	29 512	29	29 005	59·8	65 6	5	6	[illegible]	53	5 1	61 6	47	51 13	51 76					Sum 3 45	3 00	3 2	1 5	3 13	Mean 57

II.—*On the Fungi of the Neighbourhood of Bristol.* By Mr. H. O. Stephens.

To the Editors of the Magazine and Annals of Natural History.

Gentlemen,

Since the publication of my paper on the Mycology of the neighbourhood of Bristol in the Number of the Annals of Natural History for December, 1839, vol. iv. p. 246, I have gathered the following species, a few of which have not been, I believe, as yet mentioned as British.

Agaricus Clypeolarius, Bull. Flax. Bourton Coomb, Somerset.
Ag. olivaceo-albus, Fries. Leigh Wood.
Ag. pachyphyllus, Berk. Under oak trees, Leigh Wood.
Ag. imbricatus, Fries. Fir plantations, Bourton Coomb.
Ag. blandus, Berk. About way sides and in ditches among leaves, Stapleton, &c.: not an uncommon species.
Ag. marianus, Fries. Bourton Coomb.
Ag. murinaceus, Bull. Leigh Wood.
Ag. butyraceus, Bull. Bourton Coomb.
Ag. confluens, Pers. Woods, common.
Ag. undatus, Berk. *Ag. institius*, Fries Epicrisis Syst. Mycolog. vol. i. p. 386, No. 48. Leigh Wood on the ground in mossy places.
Ag. ulmarius, Bull. Rather general on elms in the autumn of 1840. Brunswick Square, Bristol. Redland.
Ag. palmatus, Bull. On a decaying tree, Leigh Wood, growing in great numbers tiled one above another, on the upper branches of the tree. Agreeing with Withering's description of *Agaricus fætidus*.
Ag. validus, Berk. Stapleton Wood.
Ag. cinnamomeus, Linn. Leigh Wood, not abundant.
Ag. cinnamomeus, Bolton, tab. 22. This Agaric though known to Purton and Withering seems to be quite a puzzle to our best modern mycologists. Greville and Berkeley consider it to be a state of *Ag. fastibilis*. Having found a few plants under oak trees in Leigh Wood this autumn, I am enabled to say positively it is not a state of the last mentioned plant. I do not draw up a character at present because the plants were old. Bolton says it abounds about Halifax, but I suppose it must be a local species or it would be better discriminated. It must bear the name of *Ag. pseudo-cinnamomeus* given by Nees ab Esenbeck in his Commentary on Bolton's Funguses appended to Willdenow's translation of that work.
Ag. bombycinus, Schæff. On an old hawthorn tree, Ashley.
Ag. stipatus, Pers. Ditches, Stapleton, Leigh Wood, not uncommon.
Ag. Candollianus, Fries. In dense clusters where trees had been felled, Stapleton.

Ag papilionaceus Bull On dung Stapleton, &c not uncommon

Ag Boltoni On cow dung Stapleton Wood

Ag radicatus Bolt On flower pots in green houses

Polyporus armeniacus Schæff On decaying branches Leigh Wood

Boletus viscidus, Linn Pileus pulvinate scrobiculate, dirty yellowish white copiously covered with slime Stem scrobiculate below the ring above the ring reticulated the reticulations formed by imperfect tubes covered with slime and of the same colour as the pileus Flesh dingy white, with a tinge of dirty yellow when bruised turning verdigris green hence *B aeruginascens* Secretan fide Fries Pores large adnate angular compound clay coloured The veil is permanent as in *Boletus Grevillei* but a portion frequently remains round the edge of the pileus, forming a shiny web as in the division *Limaceum* of Agarics A species not before detected in Britain

Hydnum membranaceum Bull On sticks, Leigh Wood *Hyd fimbriatum* Pers Ditto

Hydnum fusco atrum, Fries Epicris Syst Mycolog vol i p 515, No 66 On decaying wood, Leigh Wood

Clavaria fusiformis, Sow Leigh Wood &c Not very rare

Leotia lubrica Scop Stapleton Grove Abundant last autumn

Peziza granulosa Schum Pers Mycolog Europ vol i p 22? No 14 On the naked earth in a beech wood, Stapleton summer Not before detected in England

Pez echinophila, Bull Pers Synop p 661 No 97 On decaying pericarps of the *Castanea vesca* Cunnegar near Dunster Somerset I have likewise received it from Mr Berkeley

Pez clavo flava Grev On a stick Stapleton Wood

Pez furfuracea, Roth On hazel stumps, Leigh Wood

Phallus caninus, Hudson My plants were not inodorous as stated by Withering but detestably fœtid The uteri are frequently found empty Leigh Wood

Nidularia crucibulum and *striata* Leigh Wood

Sphæria lateritia Fries On the gills of *Ag Necator* Leigh Wood this autumn At first glueing the gills of the Agaric together with a white substance in which state it is with difficulty discriminated The contents of the perithecia which are white, ooze out as in its congener *Sph aurantia* giving the plant the frosted appearance mentioned by Fries The juiciness and decomposition of the parent plant depends upon the original nature of the matrix, for in my specimens the Agaric is dry and shrivelled

Sph fibrosa On blackthorn common *Sph Trifolii* Pers Ditto *Sph aquila* Fries On rotten sticks Stapleton *Sph ovina* Pers On decaying stumps Leigh Wood

Sph pulveracea Ehr On dry wood Leigh Wood Doubtful

Sph vagans var *Rumicis* Everywhere *Sph* (*Depazea*) *Antirrhini* Kingsdown

Phoma circinans Berk Species nova, on *Yucca gloriosa* Abundant in gardens This plant was determined by Mr Berkeley to whom I sent it with an erroneous name. An analogous species occurred on *Dracæna fragrans*.

Phacidium Patella, Tode. On stems of *Conium maculatum*. Unexpanded.

Cenococcum geophilum, Fr. Underground amongst the roots of *Bryum hornum*, Stapleton. I have received it from Mr. Berkeley.

Stilbum tomentosum, Schrad. On *Trichia clavata*, Leigh Wood.

Puccinia Glechomatis, DeCand. On ground ivy, Durdham Down.

Puc. variabilis, Grev. On *Leontodon Taraxacum*, Minehead.

Puc. Lychnidearum, Link. On *Lychnis diurna*, Stapleton.

Uredo caricina, Schleich. Epidermis ruptured on *Luzula sylvatica*, Stapleton. *Uredo Caryophyllacearum*, Johnst. On *Stellaria graminea*, Minehead, accompanied by a dark brown *Puccinia*.

Omitted.—*Thelephora arida*, Fries. On the bark of oak trees, Leigh Wood; it is not confined to the bark, but spreads over the interior of hollow trunks in wide patches.

Since my first catalogue was published I have been indebted to the politeness of Mr. J. E. Gray of the British Museum for the use of the System of Fries and Sowerby's Figures, and to Mr. Berkeley for some corrections. I therefore take this opportunity to rectify some errors in the former Catalogue.—*Cantharellus confluens* is a small densely crowded variety of *Canth. sinuosus*, Fries. *Helvella floriformis*, Sowerby. *Thelephora amorpha* is doubtful. *Sphæria incana* mihi is *Sph. coprophila*, Fries, Syst. Mycolog. vol. ii. p. 340. No. 37. It had not previously been detected in England, and therefore was not described by any British author.

HENRY OXLEY STEPHENS.

Terrell Street, Bristol, Oct. 15, 1841.

III.—*Description of Four Bats taken in Cuba.* By DR. GRUNDLACH*.

VESPERTILIO *barbatus*, Grundlach. Pale chestnut brown, tips of hair on the upper side darker. Near the muzzle provided with very short hairs, and defined by a curve of longer hairs extending from one angle of the mouth to the other, and which at the mouth angle form a kind of beard. Between the nose and this curve of hairs there is still a smaller interrupted one on the nasal bridge. Ears somewhat prolonged to an obtuse point. Tragus at the base narrow, then expanding, its inner angle curving in a point.

Entire length $2''\ 3'''$. Length from the tip of the nose to the commencement of the tail $1''\ 3'''$; consequently, length of tail $1''$. Spur $3'''$. Breadth $6'''$. Thumbs $1'''$ long.

Found in buildings of the Cafetal St. Antonio el Fundador.

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* Communicated and translated by Mr. W. Francis, A.L.S., from Wiegmann's Archiv, 1840, Part IV.

Nos 2 and 3 form a new genus* which I propose to call

LOBOSTOMA *Lobed mouthed* The characters are

Above and below 4 incisors the upper ones are of unequal size viz in the centre are two large double, and at the sides a small simple tooth and molars not yet examined as I did not wish to destroy the only specimen I have as yet taken Upper margin of the muzzle very prominent and forms with two membranaceous folds at the side of the nose a surface directed obliquely downwards in which the nostrils are likewise situated Inferior lip besides the true lip has two membranaceous folds one behind the other the anterior one furnished with warts, and the posterior one consisting partly of one piece partly divided in the middle Ears separated Tail for the greatest part hidden in the interfemoral membrane the apex free beyond the produced membrane

LOBOSTOMA *cinnamomeum* Grundlach Above dark beneath a light cinnamon brown The base of the hairs everywhere fainter Face with blacker hairs Ears short wide rounded at the inferior margin fringed with hairs which are likewise perceptible on the folds in the ears Tragus short on the inner side with an incisure Nasal ridge bald Upper lip furnished towards the angles of the mouth with longer cinnamon brown hairs with silky lustre Anterior lip leaf somewhat elongate 4 angular posteriorly bipartite each part with an indentation in the centre The nose leaves of the lower lip, margins of the ear and wings are blackish brown The hairs form a cavity above the nose and beneath the chin

Length of the entire body 3″ 5‴ Length of body from the point of the nose to the commencement of the tail 1″ 10‴ The tail is down to where it becomes free 10½‴ the free portion is 2‴ in length The interfemoral membrane extends from where it becomes free 8½‴ further Spur 8½‴ long Breadth 10½″

The only specimen was taken flying about in the evening in the room of the Cafetal St Antonio el Fundador

LOBOSTOMA *quadridens* Grundlach Colour of fur pale brownish gray the tips of the hairs on the upper side darker About the throat the colour passes more into yellow Ear aperture wide Upper margin much elongated to an obtuse point Above, at the posterior margin it is somewhat waved The lower half of the front margin is expanded the expansion itself forms four little teeth The front lip leaf extends to the angle of the mouth the hind one is undivided and but little shorter than the front one on which its margin rests The warts of the front one are only present in the centre The membranaceous folds on the sides of the nose projecting at their upper margin to a point Nose above naked Wings nose lip-leaves and margins of ears blackish brown

Length of the entire body 1″ 6½″, of the tail in the membrane

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* The genus appears to be the same with Gray's *Chilonycteris* (Ann Nat Hist ix p 1), but the species are undescribed, and differ from *Ch MacLeayii*, Gr which was likewise found in Cuba —Wiegmann

6½‴; without it 3½‴; of the interfemoral membrane from the becoming free of the tail 7½‴. Of the spur 7½‴. Expanse of wings 8″ 3‴.

Hab. Same as the former.

4. RHINOPOMA *Carolinense*, Geoffr. As from want of a good description I am not certain with regard to the determination, I will communicate the description of the animal in my possession.

Fur brownish grey. Above darker than beneath. Base of the hairs whitish. Ears wide, naked, only haired outwardly at the cohesion and inwardly in front where the concavity commences. 6—7 warts on the front margin of the ear. Furnished with longer bristle hairs on the nasal bridge, at the toes of the hind feet, and at the anus and sexual orifice. Lip large, projecting far beyond the inferior lip. Wings blackish brown. The membrane between the anterior and posterior legs is, in the vicinity of the body, beset with small tufts of hairs. The margin of the interfemoral membrane has in the neighbourhood of the tail two tooth-like projections, of which the exterior one originates from the end of the spur. Tragus 4-angular, at its inner margin somewhat sloped. Length of the entire animal 4″; of the body from the tip of the nose to the commencement of the tail 1″ 11‴; of the tail 2″ 1‴. Usually the tail is inclosed 8‴ and free 5‴. Spur 9″ long. Breadth 9¼″.

Hab. During daytime beneath the roofs at Fundador.

IV.—*Horæ Zoologicæ.* By SIR W. JARDINE, Bart., F.R.S.E. & F.L.S., &c.

No. IV. *Remarks on the Structure and Habits of* Lepidosiren annectens.

As stated at the commencement of these 'Horæ,' and implied by our motto*, we consider them intended to convey whatever information, whether partial or complete, may come in our way, and tend to illustrate zoology. The appearance of Professor Owen's important and carefully wrought paper upon *Lepidosiren annectens*, printed in the last volume of the Transactions of the Linnæan Society†, had been some time looked for, and the interest which its perusal excited was still further heightened by the loan of the other specimens of the remarkable animal which Mr. Weir discovered on the Gambia, and which have been kindly trusted for some time in our possession by the sister of that gentleman, now residing in Edinburgh. Upon examination of these specimens, some of the external parts appeared to vary from the figure and description given by Mr. Owen, and as every observation relating to the structure of an animal so curious must draw out some inference associating with those around it, we shall describe them minutely. But for the sake of those who may not have access to the valuable Transactions alluded to, which, through the various changes incident to scientific societies, especially to such as are now becoming venerable from long duration, have maintained their standard excellence both in illustrations and in the high character of communications, and also for the sake of our correspondents in distant countries, it may be right, first, shortly to run over the history of this singular genus, and the results at which Mr Owen has arrived in his recent examinations

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* See Annals, vol. iv. p. 160.

† Vol. xviii. part 3. p. 327.

The genus *Lepidosiren* was formed by Professor Natterer, from an animal discovered in the rivers, or rather in the swamps of South America Two specimens only were obtained, the one was found in a swamp on the left bank of the river Amazon, the other was taken in a pond near Borba, on the river Madeira, and they were described in the 'Annals of the Museum of Vienna,' under the generic title above named In 1837, specimens of a remarkable animal were brought from another continent, the vicinity of the river Gambia, in Western Africa, by Thomas C B Weir, Esq , and one of them being presented to the Royal College of Surgeons in London, has served Mr Owen for the account which has just now been published*

In its skeleton the Gambia species is partly osseous, partly cartilaginous, the bodies of the vertebræ, for instance, are not ossified The articular surface of the lower jaw presents a more complicated structure than is usually observed in Fishes and Reptiles The ribs are thirty-six pairs, all simple, slightly curved slender styles The tentacles or rudimentary fins are many-jointed, the colour of the bones is green, and altogether it offers a most singular and interesting combination of the cartilaginous and osseous types The muscles of the trunk present all the simplicity and uniformity characteristic of the class of Fishes There are no pancreatic cæca The intestine is traversed throughout by a spiral valve The branchiæ resemble in form those of the *Siren*, consisting of separate elongated filaments, attached only by one extremity to the branchial arch, but these extremities are fixed directly to the branchial arch, and not to a common pedicle extended therefrom, as in the *Siren* Viewed with a moderate lens, the tripinnatifid structure is beautifully seen in each branchial filament Thus, although these organs correspond in all essential points with those of the true Fishes, yet the gills approximate, in their filamentary form, to those of the Perennibranchiate Reptiles The female organs of generation present a grade as high as that which characterizes the Plagiostomous Fishes, while the elongated form of the ovaria and the convoluted disposition of the oviduct resemble more the same parts in the *Axolotl, Amphiuma* and *Siren*

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* When making out the elaborate Catalogue for the learned body to which he belongs, the generic name of *Protopterus* suggested itself, but the perusal of Dr Natterer's paper led him to believe that it was generically identical

In all its organs, with a single exception, it is considered as almost intermediate in structure, that exception exists in the organ of smell, a character "which is absolute in reference to the distinction of Fishes from Reptiles In every fish it is a shut sac, communicating only with the external surface, in every reptile it is a canal, with both an external and internal opening"

Further, Mr Owen considers the *Lepidosiren* as typical of a new family, and forming a link to connect the higher Cartilaginous Fishes with the Sauroid genera *Polypterus* and *Lepidosteus*, at the same time, it makes the nearest approach in the class, to the Perennibranchiate Reptiles

The specimen which we have examined was in total length 8½ inches, and the body was more thickly and decidedly spotted than that represented in the Linnæan Transactions The spots extend as far forward as the origin of the upper fin, but are continued still further in indistinct cloudings, they take the form of irregular blotches, and are largest, most distinct, and in greatest numbers near the caudal extremity, this may be a variation incident to the animal, in the same way that the spottings on various other fishes seldom agree The caudal fin or membrane arises gradually from the body, and the scaling is continued apparently as far as the rays reach, above this it becomes like a thin membrane, delicate and transparent, and terminates in a minute and fine point The whole appearance in fact of this part is more like that of the membrane which is produced at certain seasons upon some species of *Triton*

The extremities, or fins if they may be so termed, present some differences when compared with Professor Owen's figure and description They are each regularly barred with brown, or probably, in a living state, with dark olive In the description alluded to, "the pectoral tentacles" are said to be "somewhat shorter and more slender than the ventral ones, the former are two inches, the latter two inches four lines in length*" In our specimen it is just the reverse the principal ray of the pectoral tentacle is attenuated to a thread-like point, and is 2 inches long, the posterior is only 1⅝ths inch in length They also present another discrepancy the principal pectoral tentacle is accompanied above by two short and still more rudimentary members, which do not seem to have been present in Mr Owen's specimen They are of equal length, about $\frac{5}{8}$ths of an inch, and are barred as in the other, but not

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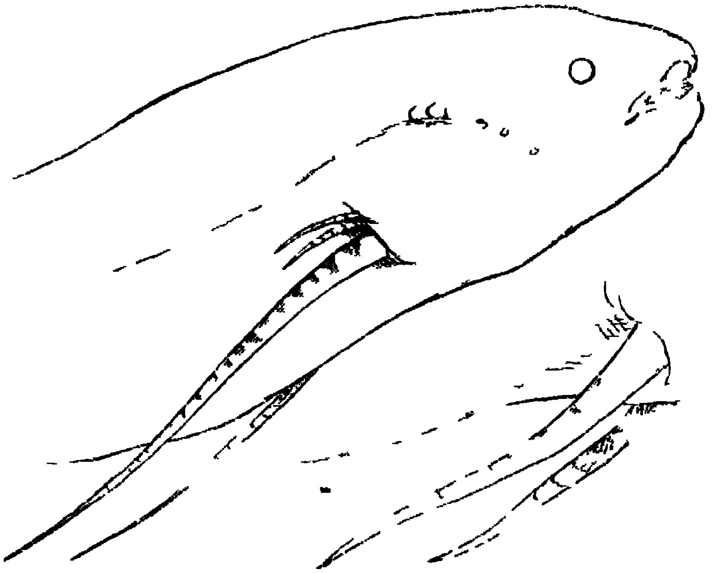
* P 330

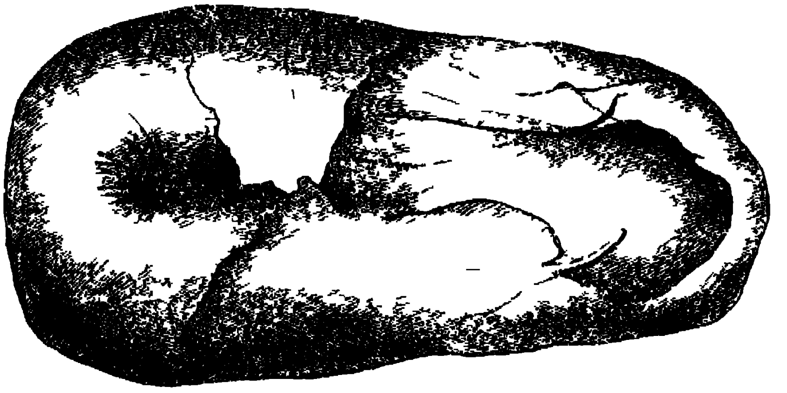


being permitted to make any dissection, it has been impossible to determine whether they were also supported by cartilaginous rays, it is probable that they may not, or that they are very slight, but their presence seems important, as presenting a passage even more modified from the true fin composed of several rays, to the state of a single tentacle destitute of any palmation or approach to the structure of a more perfect extremity The posterior tentacle is single, but is much more strongly formed than the long ray of the anterior, it presented no other differences except in comparative length Can the additional pectoral tentacles be a sexual difference?

The pores and ducts upon the head are disposed nearly as we have endeavoured to represent them in the woodcut They are very large, and supply a large quantity of mucus necessary for, or at least assisting in, the preservation of the animal when it has retired from, or is deprived of, its native element Above and in front of the eye they are tortuous and apparently continuous canals, and run backwards to commence the lateral line, and there is an angular one above where each nostril is situate, the place of which can easily be detected by looking with a magnifier at the snout, placed between the observer and the light

The progressive motions of this creature we should conceive to be performed entirely by the caudal or posterior half of the body, their direction being regulated by the tentacles We can fancy them to be very nearly similar to those of the Tritons, which advance by a wriggling or sculling motion of the tail, and direct themselves by their small anterior members, which also are used to assist in raising themselves in the water upon any body or plant, and we should scarcely consider these members at all applied or used as organs of touch

If the structure of this animal is remarkable, so also are some habits in its œconomical history, but we have to regret that our information on these points is still very imperfect Miss Weir, in allowing us to examine the specimens of the fish, accompanied them with the following note, and a piece of the hard clay alluded to in the Transactions of the Linnæan Society *, bearing the impression of the animal as if it had lain for some time imbedded in it, and with the earth in such a state as to allow the form of the cast to be retained "Fish taken in the summer of 1835, on the shore of Macarthy's Island about 350 miles up the river Gambia They were found about eighteen inches below the surface of the ground, which, during nine months of the year, is perfectly dry and hard, the remaining three months it is under water When dug out of the ground and put into water, the fish immediately unfold themselves and commence swimming about" They are dug up with sharp stakes and are used for food, the accompanying woodcut represents the manner in which they are folded up at the time they are procured, it is drawn of the natural size, from a second specimen preserved in spirits, which seemed to have been rolled up in dried leaves, or in the leaves which might have accumulated at the bottom of the water of the inundated ground, several adhered to it, and were kept in their place by means of a large supply of mucus which still invested the specimen, and may serve as a provision to assist in preserving life during the torpidity or hybernation of the animal



Note —Since writing the above observations, we have perused the important paper by M Bischoff from the translation published in a late number of the 'Annales des Sciences Naturelles' The South American species which is there treated of seems to be in several points even more nearly allied to the Cartilaginous Fishes than that from Africa, particularly in the structure of its almost cartilaginous skeleton, and in the spiral intestinal valve, which, from additional observations made by MM Bibron and Milne Edwards, appeared to be still more developed than in the *L annectens* But it has been found to differ from the last, and from Fishes, in an important particular, that of the heart possessing a double auricle, and also in the rays of the tentacles being of one piece, and not jointed The structure of the nostril we consider as entirely analogous to that of the organ in Fishes it is not a respiratory organ in *L paradoxa*, the double opening is only similar to the valvular separation of the sac in Fishes, and, from the structure of the muscles, would seem to act somewhat similarly, and they will cause the passage to resist or promote the flow of the water through it The position of the opening to the lungs or air bladder is also of importance in the consideration of this question, and is in favour of its reptile alliance, but all the modifications of form must be balanced with each other, and additional dissections are required of *L annectens*, which it may even yet be found necessary to separate and place in Mr Owen's proposed genus *Protopterus*

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* Note in vol xviii part 3 p 328

V —*Commentary on* Mr G R Gray's '*Genera of Birds*' 1840 By H E Strickland, Esq M A , F G S , &c

[Continued from vol vi p 423]

P 26 The date of Thunberg's genus *Brachyurus* (1743) seems to be a misprint but not knowing in what work it is defined, I am unable to rectify it

Myiophonus ought, I think, to be placed among the *Turdinæ* near *Petrocossyphus*

The Rock Thrushes were first defined by Boie in 1822, under the name of *Monticola* and afterwards altered by him in 1826 to *Petrocossyphus* The former name ought therefore to stand, as authors ought no more to alter their own generic names when once published than those of others But should there be any insuperable objection to the name *Monticola* (of which I am not aware) then the name *Petrocincla*, Vig 1825, has the next claim Bonaparte divides the Rock Thrushes into two genera, *Petrocincla* (*P saxatilis*) and *Petrocossyphus* (*P cyaneus*) There seems not to be sufficient ground for this separation, but if adopted, a new name should be given to *P cyaneus*, because the name *Petrocossyphus*, Boie, is a *mere synonym* of *Petrocincla*, Vig and should therefore be cancelled

P 27 *Turdus novæ hollandiæ* Gm is quoted by Mr Gray as the type both of *Oreocincla* and of *Aplonis* (p 40) I cannot at the moment ascertain to which of these genera this bird really belongs, having no specimen of it at hand

The genus *Cichla* Wagl , belongs to the *Troglodytinæ* near *Merularis* and its specific name, *atricapilla* Lin should be used instead of *longirostra*, Gm

The name *Aipunemia* Sw (αιπυς and κνημη) hould be written *Æpycnemia*

The genus *Malacocercus* (not *Malacocircus*) belongs to the *Sturnina* rather than the *Crateropodinæ* The form and colour of the bill and legs show a close affinity to *Acridotheres* Is not *Timalia Somervillei* Frankl , a synonym of *Malacocercus striatus* ?

P 28 It is not easy to say where the genus *Icteria* should be classed, but it is clearly out of place among the *Crateropodinæ* which, when reduced within their natural limits, seem confined exclusively to the old world

Tanagra capensis Sparm seems to be a synonym of *Corvinella corvina* Shaw (which in that case should be called *C' capensis* Sparm) It is certainly not a synonym of *Keropia crassirostris*

Mr Gray seems to have omitted the genus *Stenorhynchus* Gould (Proc Zool Soc pt iii p 186)

The genus *Mimeta*, Vig cannot, I think be separated from *Oriolus* Several modern authors have reunited the two genera

P 29 The name *Criniger* Tem 1820, should be used instead of *Trichophorus*, Tem , which is a later alteration

The name *Hæmatornis* Sw , 1831, ought not to supersede the prior name *Ixos* Tem Mr Swainson, in his 'Classif Birds, vol ii p 24 discards the genus *Ixos* Tem , because it is artificial i e it contains species not naturally allied This is a reason why it should be *restricted* but not why it should be *cancelled* for if this principle were admitted we must discard nearly every generic name of Linnæus If then the name *Ixos* be used for this restricted group the word *Hæmatornis* may be retained for the genus of *Falconidæ* so called by Vigors in December 1831 (*Spilornis* Gray)

After a careful study of the genera *Querula* and *Lipangus*, I feel satisfied that this sub family *Querulinæ* should merge into that of *Pyroderinæ*, Gray (*Coracina*, Sw), and secondly, that the *Pyroderina* should be placed under the family *Ampelidæ* instead of *Corvidæ* Notwithstanding what Mr Swainson says (Flycatchers, p 73) as to *Coracina* (*Pyroderus*, Gray) being merely the representative among the Crows of *Querula* among the Flycatchers, yet the proportion of parts and total structure of these two birds are so nearly identical, that it is almost a question whether they should be even generically separated Further, on comparing these birds and *Lipangus* with the *Ampelidæ* and taking also their geographical range into consideration, it will, I think, be evident to the untheoretical naturalist that the family *Ampelidæ* is their proper abode The rictal bristles at first sight form an objection, but of these we see traces in several genera of the *Ampelinæ*

The permanent specific name of the Malabar *Edolius* should be *paradiseus* Lin , not *malabaricus*, Gm It is the *Cuculus paradiseus*, Lin well figured by Brisson except that one of the fore toes is reversed in the figure which led to its being considered a *Cuculus*

Mr Gray has judiciously restored *Irena* to its place among the *Dicrurinæ*, whereas Mr Swainson had made it a sub-genus of *Oriolus*

The earliest specific name of *Corvinella* is (*Tanagra*) *capensis* Sparm This bird has also received the names of *Lanius corvoides*, Vieill , *L flavirostris*, Sw , and *L xanthorhynchus* of the Munich Museum

Collurio not being defined as a genus by Brisson and the name moreover having been applied by Vigors to a different genus it is better to retain the name *Enneoctonus* of Boie who was the first to separate this group generically from the true Shrikes

P 36 *Cyclarhis* should be written *Cyclorhis* (κυκλος and ῥις)

The type of *Telophonus* should be called *T senegalus* (Lin) It is the *Lanius senegalus* Lin , and the *L erythropterus* of Shaw, not of Linnæus

Nilaus capensis should be called *N brubru*, Lath , 1801

Vanga was first used as a Latin generic name by Vieillot not by Buffon

P 37 The genus *Cracticus* Vieill (restr) ought certainly to enter into the sub family of *Gymnorhininæ* for though the hooked beak shows an affinity to the Shrikes, yet the majority of its characters and the geographical range show a strong preponderance in favour of its alliance with *Gymnorhina* Gray

Pica colliei as described by Vigors in the 'Zool Journ ' vol iv can hardly be the same as *Cyanurus bullockii* Mr Vigors s bird has the throat black instead of white, and its dimensions differ from those given to *C bullockii* by Wagler Mr Gray must also be wrong in quoting *Garrulus ultramarinus*, Bon , under *Cyanurus bullockii* as Bonaparte, in his Osservazioni sulla 2^da^ ed Cuv Reg An p 84 says that it is synonymous with *Pica sieberi* Wagl and *Garrulus sordidus*, Sw

Is not the name *Dysornithia*, Sw prior to *Perisoreus* Bon ?

P 38 For *Crypsirina* write *Crypsirhina* To the synonyms of *C varians* add *Colius viridis*, Lath

P 39 *Gymnoderus nudus*, Gm is the *Gracula fœtida*, Lin and the latter specific name therefore has the priority

Is not Buffon s Pl Enl 268 the smaller species of *Gracula* (*Eulabes indicus*, Cuv), and not the *G religiosa*, as Mr Gray makes it ?

I should prefer placing the *Graculinæ* among the *Sturnidæ*, near *Pastor* to which group they seem much allied in structure

The genus *Pyrrhocorax* was first defined by Vieillot, not by Brisson

To the synonyms of *Corcorax* add < *Pyrrhocorax* Tem

P 40 *Megalopterus*, Smith must be changed the name being pre occupied by Boie for a genus of *Sterninæ*

If the *Acridotheres roseus* be generically separated from the rest of that genus it should bear the name of *Psaroides* of Vieillot, who was the first to point out the distinction, and Temminck s name *Pastor* should be cancelled, being a mere synonym of *Acridotheres*

P 41 The genus *Creadion* surely belongs to the *Meliphagidæ* Is it not identical with *Neomorpha*, Gould ?

The name *Sturnella ludoviciana*, Lin , is preferable to *S magna*, Lin the latter name being comparative, and only correct when the bird was classed as an *Alauda* Besides, the name *ludoviciana* is adopted by Latham, Richardson, Bonaparte &c

The genera *Sturnella* and *Amblyrhamphus* (*not Amblyrhynchus*), if carefully examined, will be found to belong to the *Icterinæ* rather than to the *Sturninæ* When thus arranged, the whole of the *Sturninæ* will be confined to the old world and the *Icterinæ* to the new, thus adding to the numerous instances in which geographical distribution coincides with natural affinities In the same way I believe it will be found that the characters of *Astrapia* refer it to the oriental group *Lamprotorninæ*, rather than to the American one *Quiscalinæ* in which Mr Gray places it

Is not Vieillot's name *Quiscalus versicolor*, prior to that of *Q purpureus* Licht ?

Lesson quotes *Corvus mexicanus*, Gm (and not *Oriolus*, as Mr Gray has it) as the type of his genus *Cassidix*

The confusion which overhangs several of the black Icterine birds of America is very great, but this is not the place to discuss the entire question I will therefore merely state that, as far as my investigations go the *Cassidix mexicanus* Less (which, however is *not* the *Corvus mexicanus* Gm) is identical with the *Scaphidura barita*, Sw If so, the names *Cassidix* and *Scaphidura* being of equal date, we may be allowed to retain the latter, and expunge the mongrel word *Cassidix* To the *Scaphidura barita*, Sw , I also refer *Cassicus niger*, Vieill , Gal Ois 89 (which, however, is *not* the *Oriolus niger*, Gm) Also note that *Scaphidura barita*, Sw , is neither *Gracula barita* Lin , nor *Gracula barita* Lath , Syn pl 18, Gen Hist pl 44 The *Corvus mexicanus*, Gm is, I have no doubt synonymous with *Quiscalus macrourus*, Sw (See Fernandez s description of his Hocitzanatl quoted by Ray and Brisson) The *Oriolus niger* of Gmelin, described by Brisson to be under ten inches in length, is a distinct species found in the West Indies and called *Quiscalus baritus* by Bonaparte It is, perhaps, the same as *Quiscalus crassirostris* Sw The *Gracula barita* of Linnæus (excluding his quotation of Brisson) seems to be known only from his description and is *not* the same with *Oriolus niger*, Gm The *Gracula barita* of Latham Syn pl 18, Gen Hist pl 44 is stated by Bonaparte in his American Ornithology to be identical with *Quiscalus versicolor* an opinion in which I concur

Cassicus and *Xanthornus* were first used as genera not by Brisson, but by Lacépède in 1799

P 42 The genus *Euplectes* was first defined by Swainson in 1830 (Zool Ill ser 2), with *E orix* Lin , for its type Is not this prior to the name *Pyromelana* Bon ?

Should not the name *Philetærus socius*, Lath., be used instead of *P. lepidus*, Smith?

The restricted genus *Ploceus*, Cuv., if *Loxia philippina*, Gm., be considered its type, will contain the greater part of the genus *Euplectes*, Sw.

P. 43. The genus *Symplectes*, Sw., seems to have a fair claim to generic distinction, a conclusion to which Sir W. Jardine arrived independently of Mr. Swainson when he gave it the name of *Eupodes*. Mr. Swainson's name, however, was published first, and must therefore be retained.

It appears to me that the genera *Spermospiza*, *Pyrenestes*, *Vidua*, *Estrelda*, *Amadina*, *Spermestes*, and *Erythrura*, ought all to be included in the sub-family *Ploceinæ*. Though the varying development of their beak presents analogies to the *Coccothraustinæ* and *Fringillinæ*, yet their true affinity to *Ploceinæ* is indicated by their peculiarly elevated culmen extending backwards on the forehead, their naked nostrils, their geographical extent, and especially by the spuriousness of their first primary quill, a character often of great value as an index of affinity. Moreover the genus *Vidua* is directly united to *Ploceus* by means of *V. chrysoptera*, Vieill., and *Ploceus capensis*, Lin.

The *Tanagrinæ* would be better placed at the end of *Fringillidæ*, so as not to separate the *Coccothraustinæ* from the *Fringillinæ*.

There is much confusion in the synonyms of *Tanagra episcopus*, but Mr. Gray is probably right in quoting Pl. Enl. 178. The original *T. episcopus* of Linnæus and Brisson seems to be the *T. sericoptera* of Swainson and the *T. cælestis* of Spix. It is probably also the *Gracula glauca* of Sparrman, though that bird is said to be seven inches long. The *T. episcopus* of Swainson's Birds of Brazil, pl. 39, seems (judging from the figure) to be only the young of his *T. cana*, pl. 37. The *T. cælestis*, Sw., Birds Braz. pl. 41, is very different from *T. cælestis*, Spix, as the wing-covers are green. It is possibly the female of *T. cana*, Sw.

There is no doubt that *Tanagrella multicolor*, Sw., is the *Motacilla velia*, Lin., and the latter specific name should therefore be used.

P. 45. On comparing a specimen of *Leucopygia ruficollis* with Lesson's very short description of his *Cypsnagra hirundinacea*, there can be no doubt of their belonging to the same genus; but as Lesson describes his bird as *blue*-black above, and says nothing of the white on the rump and wing-covers, I think they cannot be specifically synonymous. I would fain for once break through the law of priority in order to get rid of the intolerable name of *Cypsnagra*, Less., a word compounded *more Gallico* out of *Cypselus* and *Tanagra*!

Is not *Emberiza quadricolor*, Gm., an earlier synonym of *Erythrura prasina* (Sparm.)?

Mr. Gray seems to have omitted the genus *Pytelia*, Sw., type *P. elegans*, Gm., Vieill. Gal. pl. 64.

P. 46. I do not think it advisable to change the name *Pyrgita*, Cuv., to that of *Passer*, Ray. Ray does not define *Passer* as a genus, but merely applies it to designate the House-Sparrow in com mon with many other birds to which it has no affinity The Sparrows were first defined as a genus by Cuvier who gave them the name by which the ancient Greeks designated them

To the synonymes of *Montifringilla* add *Chionospiza,* Kaup

Ammodramus should be written *Ammodromus*

P 47 It does not appear why the name *Melophus cristata* (Vig) is changed to *M lathami,* Gray I see no objection to *cristata* but if there be any, Sir W Jardine s name *erythropterus* should be adopted

The name *Cynchramus* was first used *generically* I believe, by Bonaparte

P 48 *Agrodroma rufescens* Tem should be called *A campestris* Bechst

P 49 The family *Musophagidæ,* as here constituted is a very artificial group The genus *Phytotoma* should certainly be placed next to, if not in, the sub-family *Tanagrinæ* Its beak approaches in form near that of *Spindalis* Jard , and the dentations of the margin though very peculiar, have a distant counterpart in the beak of *Euphone* Its South American habitat also favours this view of arrangement

The *Coliinæ* certainly seem to form a *caput mortuum,* which no analysis has yet been able to bring within the limits of any other family of *Conirostres* They may therefore be raised to the rank of a family with the title of *Coliidæ*

The sub family *Musophaginæ* ought I conceive to be placed in the family *Cuculidæ* It decidedly belongs to the *Scansores* for live specimens of *Turaco* invariably perch with two toes behind the branch In the structure of their beak and legs they show considerable affinity to the *Cuculidæ,* especially to the genera *Phænicophæus* and *Crotophaga* It will be recollected too that the Cuculide genus *Saurothera* has the bill dentated

Mr Gray is quite correct in quoting Edwards, pl 7 under *Turaco persa* (Lin) The descriptions of *Cuculus persa* given by Linnæus and Brisson are taken from Edwards, and are based on the very rare species with *a green crest margined with red* (*C buffoni* of Swainson but not of Vieillot nor of Jardine, which is the *purpureus* Less , and *senegalensis* Sw) There is a specimen of the true *T persa* in Lord Derby s collection The name *persa* is commonly but erroneously given to the species with a *green crest margined with white* This species has never received a distinct appellation, and I therefore recommend that it be called *T albocristatus* Stephens s name *africanus* cannot be correctly used for it, for his description is inapplicable to any known species, and is a *mélange* of the descriptions of *T albocristatus* and *T persa*

P 50 According to the laws of Latinity, *Tockus* should be written *Toccus,* and *Ramphastos Rhamphastos*

The genus *Scythrops,* though it reminds us at first sight of the *Rhamphastidæ,* yet is much more nearly allied to the *Cuculidæ,* as shown by the position of the nostrils the red space round the eyes, the form of the wings and feet and the geographical habitat *Phæ-*

nicophæus forms its nearest affinity, but in the pointed wings and colour of the plumage it approaches *Cuculus*

P 51 The group *Psittacara*, as defined by Vigors in the Zool Journ vol ii seems sufficiently distinguishable from *Conurus*, Kuhl to be retained as a genus

For *Centrourus* write *Centrurus* Mr Gray has mistaken the type of this genus as defined by Swainson which is the *Nestor meridionalis* (Gm) (*N hypopolius* Wagl *Psittacus australis*, Shaw Mus Lev 87) consequently *Centrourus* Sw merges into a synonyme of *Nestor*, Wagl The *Psittacus australis* of Latham (*P concinnus*, Shaw) is hardly to be distinguished generically from *Trichoglossus* but if made distinct, will require a new name

P 52 The specific name of *Psittacodis* should be *paraguanus* Gm , not *paragua*, Marcgrave, the latter name being antecedent to the system of binomial nomenclature

For *Poiocephalus* write *Pæocephalus* the *oi* in Greek becoming *æ* in Latin and *e* in English (Hence the term *poikilitic* lately introduced in Geology should be written *pecilitic* as we write *economy* and not *oikonomy*)

Mr Gray seems to have omitted a genus of *Loriina* which wants a name It is the *Psittaculus* of Swainson, and is typified by *P vernalis galgulus* and *rubrifrons*

P 53 Mr Gray very properly restores the name *Agapornis* Selby, to its true type from which Mr Swainson had removed it and applied it to the American group *Psittacula*

The name *Psittacula* should be quoted on the authority of Brisson not of Kuhl Brisson divides the genus *Psittacus* into six subgenera which, *being based on definitions*, may be retained on Brisson's authority These are *Ara Cacatua Lorius*, *Psittacus*, *Psittaca*, and *Psittacula* The name *Psittaca*, however, being too near in sound to *Psittacus* is not retained

Pl Enl 455 f 1, quoted by Mr Gray under *Psittacula passerina*, is the basis of *P capensis*, Gm , so named from a mistake in the habitat This bird is named *guianensis* by Mr Swainson who considers it distinct from *passerinus*, Lin , which he calls *cyanopterus* The chief distinction is that the *guianensis* Sw (*capensis* Gm) has the rump *green*, while in the *passerinus*, Lin (*cyanopterus*, Sw), it is *blue*

The bird figured in Phillips, Voy Bot Bay p 267 pl 40 is not the *Calyptorhynchus banksii* (Lath) but the *C cookii* (Tem)

The name *Corydon* Wagl , cannot stand as it was pre occupied in 1828 by Lesson (Man Orn vol i p 177) A new name will therefore be wanted for *Corydon* Wagl

Psittacus nestor was, I believe, never *published* by Forster under the name of *hypopolius*, consequently the name *meridionalis*, Gm , has the priority

The sub families composing the family *Picidæ* as arranged by Mr Gray, are not of equivalent value The *Bucconinæ Picumninæ* and *Yuncinæ* form three groups apparently of equal value, and the Woodpeckers form a fourth , but the *Picinæ*, *Dryocopinæ*, *Celeinæ* and *Co-*

laptinæ are only subdivisions of the group Woodpeckers These last should therefore be united into one sub family *Picina* or, if divided they should form groups of a lower denomination than a sub family

P 54 Mr Gray is quite right in keeping the name *Picumnus*, Tem , for the American group (*Asthenurus* Sw) because Temminck evidently regarded this as the type of his genus, making it the first division and giving the name *abnormis* to the Asiatic group (*Picumnus* Sw *Microcolaptes*, Gray)

Mr Gray quotes Rich Faun Bor Am pl 56 for *Picoides tridactylus* (Gm), but Richardson's bird is the *P hirsutus* (Vieill) which Bonaparte considers as distinct from the European *P tridactylus*

Hemicircus should be written *Hemicercus*

It does not appear why a new name is given to the genus *Dendrocopus* proposed by Boie and sanctioned by Bonaparte the name *Dendrocopus* Vieill being superseded by *Dendrocolaptes*

The name *Dendromus* is pre occupied for a genus of Mammalia by Dr Smith in Zool Journ vol iv p 438

Mr Gray seems to unite the American *Dryotomi* of Swainson with the European group *Dryocopus*, Boie (*D martius*) and indeed they can hardly be distinguished in structure, though Bonaparte keeps them separate

P 55 The name *Tiga* Kaup 1836 (Thierreich, vol ii p 37), must supersede *Chrysonotus*, Sw , 1837 The species will then stand as *Tiga tridactyla* (Sw)

After the Green Woodpeckers have been distinguished as *Gecinus* Boié, Swainson's genus *Brachylophus* still includes two well-marked groups first, the Short thumbed Woodpeckers closely allied to *Tiga*, containing 1 *P aurantius*, Lin (*P bengalensis* Gm) 2 *P goensis* Gm , 3 *P philippinarum*, Lath 4 *P hæmatribon*, Wagl and 5 *P erythronotus* Vieill To this group I would propose the name BRACHYPTERNUS The remaining group contains the Crimson Woodpeckers *P miniatus* and *puniceus* I am not aware whether Boie includes these species in his genus *Gecinus* but if not, they may retain the restricted name *Brachylophus* Sw which in that case, not being precisely equivalent to *Gecinus*, Boié, would escape obliteration as a synonyme

It is not easy to decide which of the specific names of *Geococcyx* has the priority Mr Swainson states (Classif Birds vol ii pp 140, 325), that he named it *longicauda* in the Catalogue of Bullock's Mexican Museum in 1824 If, however it was merely *named* at that time and not *described* the name cannot be considered to have acquired a right of priority, as the slovenly practice of merely reciting the *names* of new species without defining their characters (for many examples of which see Lesson's Traité d'Ornithologie) cannot be too much discouraged as it only tends to choke up the science with synonymes It does not appear whether Blainville ever *published* this species under the name of *Saurothera bottæ* and therefore the name *californiana* used by Lesson in his Supplement to Buffon some time previously to 1831, will probably turn out to have the prior claim to all others

P 56 The *Centropus ægyptius* (Gm) seems to be the same as *C senegalensis* (Lin), which latter name will therefore prevail

The name *Coua*, Levaill , was, I believe, never used as a Latin word and therefore ought not to supersede *Serisomus* Sw

The *Cuculus guira*, Gm distinguished by having only eight feathers in the tail ought surely to be generically separated from the "four-winged Cuckoos' (*Diplopterus* Boié) The former constitutes the group *Guira*, Less , 1831 of which *Octopteryx* Kaup 1836 and *Ptiloleptus*, Sw , 1837 are synonymes The type will stand as *Guira piriragua* (Vieill), *Cuculus guira*, Gm *Ptiloleptus cristatus* Sw

P 57 Should not *Ptilonopus* be written *Ptilopus*? (from πτιλον and πους)

Is *Treron* Vieill prior to *Vinago* Cuv ? Cuvier says of the latter name Vieillot has changed it to *Treron*

P 58 *Turtur* was first used as a generic name by Mr Selby in 1835

The name of the first genus of *Gourinæ* should be altered from *Peristera* Sw , to *Phaps* Selby and the second from *Leptoptila* Sw , to *Peristera* Sw In 1827 Mr Swainson defined an American group as *Peristera* and in 1835 Mr Selby defined an Australian group as *Phaps* So far all was well, but in 1837 Mr Swainson thought proper to transfer his name *Peristera* to the *Phaps* of Selby and to give a new name *Leptoptila* (misspelt *Leptotila*) to the genus which he had previously called *Peristera* It behoves the advocates of the *priority* principle to discountenance such wanton changes by bringing back these genera to their original designations

The specific name *jamaicensis*, Lin , should supersede *rufaxilla* Wagl

P 59 I see no reason why the name *Geophilus*, Selby (restr) should not be retained for the *Columba nicobarica* as Dr Fleming did not include it in his genus *Verrulia*, and consequently *Geophilus* is not the precise equivalent of *Verrulia*

To the synonymes of **Goura**, Flem , add **Megapelia**, Kaup

Chamapetes should be written *Chamæpetes*

If **Mitu** be retained as a generic name it should be Latinized into **Mitua** Lesson is I believe the first author who attached the name of **Mitu** to a genus and it should therefore be quoted on his authority, not on Marcgrave s

P 60 *Syrmaticus reevesii* ought to bear the name of *S superbus* (Lin) There can be no doubt that this is the species intended by Linnæus, though his description of his *Phasianus superbus*, taken from Chinese documents is by no means accurate We have the authority of Temminck and Sir W Jardine for this identification

To the synonymes of **Euplocomus** add *Spicifer*, Kaup 1836

The Impeyan Pheasant is the true type of *Lophophorus*, Tem 1813, and this name should therefore supersede *Monaulus*, Vieill

The *Phasianus leucomelas*, Lath , if generically distinct, must have a new generic name

It is not correct to quote *Lophyrus* Steph as a synonyme of *Lophophorus* the word *Lophyrus* being merely a mistake of the artist who engraved Stephens's plate 36, vol xiv

P 61 *Francolinus* was first defined as a genus by Stephens, 1819

It is to be regretted that the legitimate name *Arboricola* had not occurred to Mr Hodgson instead of the hybrid word *Arborophila* but it is too late to change it

Coturnix was first used generically by Cuvier about 1802

For *Ptilophachus* write *Ptilopachys*

The name *Cryptonyx* Tem 1815, is prior to *Liponyx*, Vieill 1816

P 62 Brisson does not use *Bonasa* to designate a genus, and the name *Bonasia* Bon , may therefore be retained

P 63 The *Turnicinæ* would range more naturally among the *Tetraonidæ* than among the *Tinamidæ*

For *Rhyncotus* read *Rhynchotus*

P 64 The family *Charadriadæ* ought to be in contact with *Scolopacidæ* although most modern authors interpose the *Ardeidæ* between them

It is very doubtful whether *Œdicnemus magnirostris* Tem , Pl Col 387, can be correctly quoted as the type of *Burhinus* Ill Latham described a bird under the name of *Charadrius magnirostris*, *the size of the Golden Plover, bill stout and very broad, resembling the Tody genus* " From this description Illiger founded his genus *Burhinus* Wagler, in his monograph of *Charadrius*, quotes Latham's description and places it among his species a me non visæ '

He also describes as a distinct species the *Œdicnemus magnirostris* Tem under the name of *Charadrius magnirostris* This bird is described as *from 17 to 20 inches long, with the beak much longer, stronger and more compressed than the other Œdicnemi*, and it seems therefore quite distinct from *C magnirostris* Lath Lesson however, unites the two in his genus *Burhinus*, and in order to admit Temminck s bird he greatly modifies the original definition of that genus, for instead of the "*Rostrum latum, depressum*" of Illiger, we find in Lesson ' *bec très comprimé sur les côtes* ' It would seem then that the true *Burhinus* of Illiger if such a bird really exists has yet to be discovered and that a new generic name is wanted for the *Œdicnemus magnirostris* of Temminck

To the synonymes of *Ortygodes* Vieill , add *Ortyxelos* Vieill

The *Hemipodius nivosus*, Sw , has the neck and breast ferruginous with white spots, and is therefore perhaps distinct from *Ortygodes meiffreni*

The earliest specific name of *Pluvianus melanocephalus* (Gm), is *P ægyptius* (Lin)

P 65 The specific name of *Squatarola*, viz *cinerea*, Ray, ought not (for reasons above given) to supersede Linnæus's name *helvetica*

Lesson, in his Traité d Ornithologie, has made it *almost* certain that the *Corrira italica*, Gm, is the *Dromas ardeola*, Paykull, but as long as any doubt remains, it is better to retain the latter name as Mr Gray has done

P 66 The four genera, *Egretta, Ardeola, Botaurus* and *Nycticorax* originated not with Brisson but the two first with Bonaparte, and the two last with Stephens

For *Tigrisoma lineata* read *T lineatum* (All words ending with *soma, stoma* &c, are neuter)

Ought not the genus *Herodias*, Boié, as restricted by Bonaparte, to be kept distinct from *Egretta*?

P 67 For *Leptoptilos* write *Leptoptilus* (The terminal *os* in Greek is always made *us* in correct Latin)

The specific name *argala* is Latham's, not Gmelin's, but as Gmelin's name *dubia* though prior, implies an erroneous proposition for the species is *not* dubious, Latham's name may be allowed to stand

The genus *Ibis* was founded not by Brisson but by Lacepède

The genus *Falcinellus* attributed to Ray' is, I believe now first established by Mr Gray If retained a new specific name will be wanted for the European bird, as Colonel Sykes is of opinion (Proc Com Zool Soc pt ii p 161) that the *Tantalus igneus* Gm [illegible] distinct from *T falcinellus*, Lin It would, however, be far better to give a new name to this genus if a genus it be the name *Falcinellus* being pre-occupied by Cuvier who asserts that Vieillot changed it to *Erolia*

P 68 The genus *Numenius* "Ray" was founded by Latham

Limosa 'Briss was first used generically I believe by Leisler, and *Totanus*, Ray' by Cuvier 1802

The name *Gambetta* "Briss,' is now first used generically by Mr Gray and therefore should not supersede *Actitis*, Ill, as restricted by Boié

P 69 For *Macroramphus* write *Macrorhamphus*

P 70 I have been quite unable to reduce the synonymes of the genus *Rhynchæa* into order, and Mr Gray would do a good work if he would publish a monograph of this genus with all the synonymes at full length, and with the distinctive characters of the species

Mr Gray must be in error when he unites the *Scolopax paludosa*, Gm (*S undulata*, Bodd) with *S sabini* Vig Bonaparte, in his elaborate monograph of the genus *Scolopax*, in the 'Observ Cuv Reg An' p 123, describes *S paludosa* Gm, as having the beak 3½ inches long and the lateral rectrices 'angustissimi acuminati' characters which do not apply to *S sabini*, which Bonaparte there calls (after Vieillot) *S sal halina*

I cannot approve of separating *Scolopax gallinula* Lin generically from the other Snipes, but those who do so should retain the name *Gallinago* (founded by Stephens) for the true Snipes, and call the *S gallinula, Philolimnus*, Boié At any rate, the specific name *gallinula*, Lin, should not be superseded by a term used previously to the binomial System

The specific name *lobatus*, Wils, should not be given to *Steganopus*, because it was used by Wilson under the erroneous impression that this bird was the *Tringa lobata*, Gm The specific name *wilsoni* Sab seems to be next in priority and should therefore stand

Is *Steganopus* Vieill , prior to *Holopodius* Bon ?

The family *Palamedeidæ* will probably require to be remodelled Although not prepared to go into details at present I think it probable that the *Parrinæ* and *Palamedeinæ* would be better arranged under *Rallidæ* and *Megapodinæ* divided between the *Turdidæ* and the *Cracidæ*

P 71 The earliest specific name of *Menura* is *superba* given by Davies in the Linnean Transactions in 1800

The term *Ortygometra* or Mother of the Quails " was an old name applied by Aristotle Aldrovandus Ray and Brisson to the Corn Crake therefore, when Bechstein divided these short beaked Rails from the rest of the genus *Rallus*, no term could have been more appropriate, but unfortunately he neglected to use it and preferred the term *Crex* Now as Bechstein was the first to define the genus the name *Crex* must be retained and *Ortygometra* cancelled, since it would not be correct to retain the latter (as Bonaparte does) for the remaining group (*Porzana*, Vieill), in which the Corn Crake is not included

The name *Ocydromus australis* (Sparm) has the priority of publication over *O troglodytes*, Gm

P 72 The genus *Gallinula* was founded by Latham

The *Heliorninæ* would I think enter more naturally among the *Colymbidæ* than among the *Rallidæ*, though they certainly connect the two groups

The *Phœnicopterinæ* ought not to be included in the *Anatidæ* They surely form too marked a group to be placed on a par with the subdivisions of Linnæus's genus *Anas* They should rather be made into a distinct family and be placed near the *Ardeadæ*, to some of which (*Platalea* and *Ibis*) they show an affinity in the scarlet plumage, a colour wholly unknown among the *Anatidæ*

P 73 *Chlœphaga* should be written *Chloephaga*

The genus *Bernicla* Briss ' was founded by Stephens, 1824, and *Cygnus* Briss , by Vieillot 1816

P 74 *Querquedula* owes its foundation as a genus to Stephens, 1826

To the synonymes of *Micropterus cinereus* add *Oidemia patachonica*, King

Oidemia should be written *Œdemia* Add to its synonymes *Maceranas*, Less

To the synonymes of *Somateria* add *Platypus*, Brehm

The genera *Fuligula* and *Harelda* were first published by Stephens, 1824

For *Kamptorhynchus* write *Camptorhynchus*

P 76 The *Mergidæ* should not be regarded as a distinct family from the *Anatidæ*, they are only narrow beaked Ducks, forming a subfamily allied to *Fuligulinæ*

For *Podicepsinæ* write *Podicipinæ*

It surely savours of hypercriticism to divide the Little Grebes (*Sylbeocyclus*, Bon) from *Podiceps*

P 77 The generic name *Catarrhactes*, Briss , should be used instead of *Eudyptes*, Vieill and the specific name *demersus*, Lin instead of *chrysocome*, Forst This genus *Catarrhactes* of Brisson is prior in date to Brunnich s genus, which he called *Catarrhacta* (*Lestris* Ill restr)

The genus *Mergulus* was first defined by Vieillot 1816

An *h* should be inserted after the *r* in *Synthliboramphus* and *Ptychoramphus*

P 78 *Wagellus* ' Ray, is now first introduced as a genus by Mr Gray and therefore should not supersede *Fulmarus* Leach

The name *Catarrhacta* Brunn being too near *Catarrhactes*, Briss should give way to *Lestris*, Ill

P 79 *Chroicocephalus* should be written *Chræcocephalus*

The name *Gygis alba* (Sparr) is prior in date of publication to *G candida* (Forst)

The true type of *Viralva* Leach, as exhibited by Stephens is the Black Tern (*Sterna nigra*, Lin) Therefore Boie s name *Gelochelidon* should be retained for the genus which contains *Sterna anglica*, Mont and the name *Viralva* (first published in 1825) sinks into a synonyme of *Hydrochelidon* Boie 1822, which is typified by *S nigra*, Lin Also note that *Anous* Leach is synonymous with *Megalopterus* Boié and not with *Hydrochelidon* Boié and that *Anous niger* Leach is synonymous, not with *Sterna nigra* Lin , but with *Megalopterus stolidus* (Lin) Boié

The genera *Thalasseus* Boie *Gygis*, Wagl *Sternula* Boié and *Hydrochelidon* Boie appear not to possess structural characters sufficient to entitle them to generic separation from *Sterna*

P 80 The genera *Sula* and *Fregata* were first raised to that rank by Lacepède in 1799

In concluding this Commentary an apology is due for the length to which it has extended, but I felt it impossible to do justice to Mr Gray's book without going into considerable detail I should be sorry if any person should be led by the *number* of these criticisms to form an unfavourable idea of the general accuracy of the work A large proportion of the above remarks rest on questions of *opinion*, in which Mr Gray is perhaps as likely to be right as I am, and even where I have detected errors they are only such as are unavoidable in the first edition of a work in which so much labour and research is compressed into so small a compass I conclude therefore with most heartily recommending the ' Genera of Birds to the favourable notice of zoologists

Postcript —I beg to add one or two remarks which have occurred to me since this Commentary went to press

Page 1 of Mr Gray s book In my remarks on the *Vulturinæ* I had not noticed that Temminck has proved the *Ægypius* of Savigny to be only the young of the *Vultur auricularis*, Daud (See Tem Man Orn part iv p 586) Therefore the generic name *Ægypius* should be given to the group containing *V auricularis* and *pondicerianus*

P 4 *Asturina cinerea* Vieill is said by Cuvier to be the same as *Falco nitidus*, Tem , Pl Col 87 If this be the case, *Asturina* might stand as a distinct genus, being quite different from *Cymindis* (N B Temminck's Pl Col 87 can hardly be the *F nitidus* of Latham whose expression legs long,' agrees better with the *F hemidactylus* Tem Pl Col 3)

The genus *Astur* was founded by Lacepede in 1799, and is therefore clearly prior to *Dædalion* Sav

VI —Mr Shuckard *on his falsely alleged participation in* Mr Swainson's *views of Natural Arrangement*

To the Editors of the Annals and Magazine of Natural History

Gentlemen,

I appeal to you to do me justice against the impression that may be made by what professes to be an "Analytical notice of the 129th volume of Lardner's Cabinet Cyclopædia, entitled, 'On the History and Natural Arrangement of Insects,' by *William Swainson*, F R S, &c, and *W E Shuckard*, Libr R S, &c, published in the 3rd Number of 'The Entomologist,' written by Mr Newman"

In an advertisement prefixed to this volume of Lardner, dated from my residence, and of course emanating from me, I said, "Those paragraphs in this volume with the initials '*W E Sh* are written by Mr Shuckard, and where several of these follow each other they are affixed to the last only, but the system of classification is exclusively Mr Swainson's" Now, notwithstanding this, which it will be seen below that the 'Analyst' was aware of, he says in the first page of his notice *, "I will now endeavour to show the views entertained by *Messrs Swainson and Shuckard* on the subject" thus clearly identifying me with the whole scheme, for following this is given the dry systematic frame of the work He then says, "A glance at this arrangement will convince the reader that no charge of plagiarism can possibly be brought against its *authors*" thus confirming my identification with the system and a line or two beneath this he again says, "If the views of *Messrs Swainson and Shuckard* display the slightest approach to nature, then are those of Mr Macleay the most distorted, wild and unnatural there is no point of similarity between the systems, except the frequent recurrence of the number Five The bold alteration made by the *authors* in separating the Diptera from winged insects, is the most striking feature in the new arrangement, it proves *them* to be profound and original *thinkers*, and not only this, it displays an indifference to the

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* The Entomologist, No III p 38

"opinions of others, which must be the result of the *mens* "*conscia recta*"

Would you think it possible, gentlemen, that this repetition of my assumed identity with the system of Mr Swainson could be made in the face of this Latin phrase, and of the prefixed advertisement? and you will scarcely believe me when I tell you that their writer, at the end of the article, says, very coolly, at the bottom of this same page*, "I have "been led from its title to assign the merits of this volume "conjointly to Messrs Swainson and Shuckard, and have "been treating them like the Siamese twins, as inseparable "in fame, but *fairness* compels me to add that *the system* "*of classification is entirely Mr Swainson's* Mr Shuckard "has most ingenuously disavowed any share in this, the great "feature of the work, and I am compelled to place the "chaplet of laurel on the brows of Mr Swainson alone,— "*palmam qui meruit ferat!*"

One would have supposed, if "fairness" was to have any influence in the matter, that the writer being fully aware, as he here shows himself to have been, that I had no participation whatever in Mr Swainson's system of classification, it would have "compelled" him to abstain from carrying on through the whole of his article these imputations, which he with such amusing naiveté confesses he all the while knew to be unfounded and is it not rather surprising that, having been driven thus to strangle these his unfortunate offspring from despair of being able to maintain them, he should not at once have quietly buried them out of the way, rather than leave their remains exposed to testify against their parent and their executioner? It would be superfluous for me to make any remark, his own statement is sufficient to give your readers an idea of the *fairness* to be expected in such 'analytical notices'

No man has a right to complain of *his own* scientific views being *fairly* discussed, but every man has a right to repulse the attribution of views which he does not hold My own ideas of 'system' must be known to many entomologists, for what I formerly said in my 'Essay on the Fossorial Hymenoptera†,' and subsequently repeated in this journal as lately as July last[*], ought to secure me from the suspicion of being wedded to any of these dictatorial systems, which conveniently contrive that where gaps occur in their hypotheses the creatures are yet to be found that must fill them, and where inconvenient redundancies exist in Nature, these are made to merge in groups to which they have no ostensible affinity To such systems may be applied the judicious observations of the reviewer of Gœthe's 'Theory of Colours[†]' they "intentionally obscure what they cannot illustrate, and " affect to be profound when they are only disguising their ignorance" I have not even faith in the Septenary system[‡], although that is illuminated by the ***seven*** golden candlesticks[§] of Solomon's temple[||], and has found in the ***sabbath*** an ***hebdomadal*** repose from the labours of such crude concoctions[¶], but of which Burmeister said, "what is good in it is not new, and what is new is not good," and this has since been repeated here by a very courteous friend[**] of the author of the system Trusting that this appeal to your candour and sense of justice will not be in vain, I subscribe myself, gentlemen,

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* The Entomologist, p 40

† Page 11 I conceive that when all the created species are fully ascertained, the true system will be found to be neither circular, square, nor oval, neither dichotomous, quinary, nor septenary, but a uniform meshwork of organization, spread like a net over the universe But what gaps remain to be filled! We are truly as yet scarcely upon the threshold of the great temple and consequently still remote from the adytum where the veiled statue reposes We have not yet learnt our alphabet, for species are the letters whereby the book of Nature must be read London, 1835

Your very obedient servant,
W E Shuckard

31 Robert Street, Chelsea, Feb 4, 1841

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[*] At the conclusion of the 'Monograph of the Dorylidæ, where I said, "The object I have pursued in studying Natural History has been to ascertain facts, or in their absence the closest possible approximation to them, for I am sure, to use the words of our great bard,

'Nature is made better by no mean,
But Nature makes that mean

And she is too protean in her disguises to be fitted by any boddice we may choose to invest her with

[†] Edin Review, Oct 1840, p 111

[‡] *Sphinx vespiformis*, by Edward Newman London 8vo 1832

[§] Were I disposed to cavil at such a display as the adduction of these numbers, made evidently in good earnest, and not sportively, for really it would have been too profane to have cited Scripture in jest, I might object to the incorrectness of the Septenary's attribution of *seven* candlesticks to Solomon's temple, for they consisted of *ten*, five being placed on the right side and five on the left of the oracle (an argument in favour of the quinarians!), and Moses's single candlestick had but six branches, although, it is true, seven lamps were suspended from it, but *seven candlesticks* occur only in the vision of St John at Patmos, which shows what a fantastical affair a system founded upon these seven candlesticks must be I trust that when the '*Septenary* dreams again, *his* revelation will be more pertinent than it is in the present instance

[||] *Sphinx vespiformis*, by Edward Newman London 8vo 1832 Page 15

[¶] Wiegmann's Archiv vol i No 4

[**] Westwood's Introduction to the Classification of Insects, vol i p 20

VII —Excerpta Botanica, *or abridged Extracts translated from the Foreign Journals, illustrative of, or connected with, the Botany of Great Britain* By W A Leighton, Esq, B A, F B S E, &c

No 5 *On the Anther of* Chara vulgaris *and* Chara hispida, *and the Animalcules contained in it* By M Gustavus Thuret (Ann des Sc Nat vol xiv p 65)

In the axillæ of the branches of *Chara*, immediately below the carpels, are globular sessile bodies, of a vivid red colour, which, entirely disappearing on the approaching maturity of the carpels, are conjectured to perform the functions of stamens, although in other respects they possess no analogy of organization with the male organs of Phanerogamæ The outer covering of these consists of a membrane formed of transparent cellules, which produce the appearance of a white ring encircling the anther Under this membrane are irregular oval cellules arranged into triangular valves, each valve being composed of from twelve to twenty cellules radiating from a common centre, and enclosing the red granules which produce the brilliant colour of the anther On the full development of the anther these valves disunite, and permit the bodies enclosed in their interiors to expand in the water Those anthers most remote from the central axis always open first, and those on the lower whorls before those on the upper ones The interior of the anther is filled with flexuose, transparent, chambered (*cloisonnées*) filaments, of unequal length, emanating chiefly from a central cellular base, from which also radiate a few ovoid utricules, containing orange-coloured granules Each of these utricules adheres to the cellular base by its narrowest extremity, and is fixed perpendicularly by its largest extremity to the centre of one of the triangular valves The contained granules are oval, orange-coloured, and arranged in a linear series, whilst, on the contrary, in the cellules of the valves the granules are round, red, scattered without order, and distant from the walls of the cellules

In these chambered filaments the animalcules are produced These filaments, when examined in a very young state, appear only as oval utricules enclosing a granular matter, some of them being detached, but the greater number adherent to the cellular base before mentioned A little later these utricules become chambered, a nucleus appearing in each chamber or division The introduction of the water through the walls of the filaments seems to conduce towards the formation of the nucleus, at least such is my conjecture, from having frequently observed the rapid formation of the nucleus in filaments which previously possessed no traces of it These nuclei have a slight green tinge, probably owing to an optical illusion, and become brown by iodine They are always affixed (*adossés*) to the partitions (*cloisons*) Gradually they become effaced, and the animalcules begin to be distinguished, indeed, they are frequently observable at one extremity, whilst the nuclei remain at the other, even in the same anther and filament On the complete formation of the animalcules, the partitions of the chambers are indistinguishable, from the confusion arising from the great number of the curves At each curvature of the animalcule a swelling (black or brilliant, according to the increase or diminution of focal distance) is perceived, doubtless owing to the optical illusion produced by the greater thickness of the body at these points of flexion

The animalcules are at first motionless, and remain for a greater or lesser time in the water before they begin to move and struggle to release themselves from their prison In this they do not always succeed, although their twisted position attests the efforts made for disengagement Those which do succeed escape laterally by a sudden motion, similar to the elasticity of a slackened spring After this great effort they remain for some time motionless, or if the temperature and season be unfavourable, their motions are slow and soon cease On the contrary, the animalcules observed at the end of June and beginning of July agitated themselves with extreme vivacity, and in such a manner as to leave no doubt of their animality They rapidly traversed the field of the microscope in different directions, crossing and meeting each other, and deviating from their route, and after employing the greater portion of the day in observation, they were left in similar and unrelaxed motions

The portion of their body most apparent appeared like a spirally-rolled thread of three to five curves (*un fil roulé en tirebouchon, formant de 3 a 5 tours de spire*) They were slightly tinged with green similar to the nuclei, and like them turned brown with iodine, their two extremities becoming more or less coloured (according to the quantity of iodine employed) than the rest of the body, thus indicating a difference of nature in these portions At a little distance behind one extremity proceed two bristles or tentacula of excessive tenuity, which the animalcule incessantly agitates with great rapidity These are probably organs of locomotion similar to the filiform prolongation found in the Infusoria without ciliæ Indeed, the part thus furnished with tentacula moves foremost, drawing after it the rest of the body, which turns about in the water, but always preserves its *turriculate* form The incessant agitation of these tentacula and their extreme tenuity rendered it impossible to observe them in the living animal, recourse was therefore had to the evaporation of the water or to the application of a slight tincture of iodine, when the animalcules ceased their motions, became contracted, and their spiral unrolled, when the tentacula were rendered very distinct, from their brown colour These tentacula were frequently observed to be soldered together from one-half to one-third of their length upwards, but others were also noticed to be entirely separated down to their bases A swelling similar to that in the flexure of the body was perceived in their curves

Ammonia arrested their motions and contracted the body gradually into a small oval mass, but did not produce the phænomenon of decomposition by solution (*diffluence*) so remarkable in the Infusoria A very weak solution of chlor hydric acid in water violently contracted them into a shapeless mass

In escaping from the filaments a portion only of the body of the animalcule was sometimes disengaged, and fruitless efforts were made by it to extricate the rest In such cases it was noticed that the portion bearing the tentacula invariably remained within the tube of the filament On the filaments becoming empty, their divisions reappeared very distinctly No traces of the passage of the animalcule were observed, unless the brilliant points sometimes seen on each division of the filament be regarded as such

The ovoid utricules accompanying the filaments are spheroidal in the young anthers, but subsequently take the form of an egg truncated at both ends, or nearly that of a parallelogram, having one of its ends narrower than the other Their wall or paries is transparent, the orange granules contained in them being of an elongated form, and lying in longitudinal lines in the direction of the currents of circulation, their upper extremity alone being destitute of them

In the interior of the utricules is frequently an oval globule, generally motionless, but sometimes circulating with greater or less rapidity along the walls Besides this globule, which is apparently formed of a granular fluid, are seen the rapid currents ascending and descending longitudinally. These two circulations, which are doubtless different appearances of the same phænomenon, occur either together or separately in the same utricule In some utricules the globule was motionless, whilst three round and thick orange-coloured granules ascended and descended together rapidly along the same line of circulation, and continued visible from one extremity to the other

After long immersion of the utricules in water, the arrangement of the orange-coloured granules apparently proved the existence of a double sac in which the granules were contained The circulation in this case was similar to that described by Mr Slack in hairs of *Tradescantia* (Trans Soc Arts, vol xlix p 41) "Each articulation appeared to consist of an exterior glassy tube Between this and the colouring matter was the circulating fluid with its molecules The coloured fluid of the hair appeared to be enclosed in a membranous sac, which formed an axis around which the fluid circulated"

On crushing the anther there were observed some purple hairs formed of an immense quantity of granules of extreme minuteness, endowed with a very quick molecular motion

Iodine rendered the orange granules green Alcohol did not dissolve them The latter did not arrest the circulation of the nucleus in the ovoid utricules, although it instantaneously killed the animalcules

VIII —*Notes on Saxifraga umbrosa* By CHARLES C BABINGTON, M A , F L S , F G S , &c , and by the Reviewer of Baines's 'Yorkshire Flora'

IN the 39th Number of these Annals (vol vi p 401), the Rev W T Bree expresses his doubt if the *Saxifraga umbrosa* is "in fact a *genuine* native of Britain,' and if he had said Great Britain, I should have been inclined to say that it has all the appearance of having been introduced, and that much more evidence is requisite before we ought to admit it to have been a genuine native Concerning Ireland, however, I must express quite the contrary opinion, being convinced that there is *no* plant that has a more decided claim to be considered as certainly indigenous I have myself seen it in the greatest plenty upon the wild mountains of Connamara and Joice's county, but certainly did not notice it in the neighbourhood of Killarney, where *S Geum* is peculiarly abundant

It is worthy of notice, that the plant found in Connamara differs as a variety from the Pyrenæan plant, by having its leaves dentate, crenate, and not simply and bluntly crenate, as in the plant from the Pyrenees The figure given in Eng Bot (t 663), which was taken from a specimen gathered at Throp Arch woods, in Yorkshire, approaches much more nearly to the foreign than to the Irish plant, and I have reason to believe that all the 'London Pride' found "wild" in Great Britain will prove to be the blunt crenate-leaved plant, and to have escaped from cultivation, or been intentionally planted

St John's Coll , Cambridge, Feb 8, 1841

On *Saxifraga umbrosa*

The writer of the notice of Baines's 'Yorkshire Flora' begs to state, in reference to Mr Bree's paper, that he mentioned *Saxifraga umbrosa* as abundant in the west and south of Ireland, in consequence of having seen it himself in great quantity in the west of the county of Cork during a botanical tour made in the year 1811, and having heard from friends whom he considered as good judges, that it is equally common in Connaught He considered himself as knowing *S hirsuta* and *S Geum* at the time he made the tour referred to, and he is confirmed in the belief that he did not commit an error, by having now before him a MS journal of a rather more extended tour through the same district in 1809 by Mr James Drummond, then curator of the Cork Botanic Garden, from which it appears that Mr Drummond found *S umbrosa* abundantly in the county of Cork, and also met with both *Geum* and *hirsuta* in the mountains between Cork and Kerry

The station of *S umbrosa* at Thorpe Arch would be very suspicious, had it not been noticed before the grounds were ornamented as they are at present, and by such an accurate botanist as, for example, the late Rev W Wood of Leeds Respecting the other Yorkshire stations the writer can give no opinion

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IX —*Notes on Birds* By T C Eyton, Esq , F L S

No I

I propose in the following series of papers to give from time to time such extracts from my note-book relating to Birds as I think likely to prove interesting to my readers, the first portions will be principally occupied with anatomical notes on some Australian Birds received from Mr Gould, and on some received from Malacca With regard to the former birds, it is not my intention to go minutely into detail, or further than what I believe to be necessary to show the position of each in a natural arrangement I take this course, as I understand that eminent anatomist, Mr Owen, has undertaken to furnish Mr Gould, for his work on the 'Birds of Australia,' with a more detailed account

Menura Lyra, Shaw. Male

Tongue tapering towards the tip, which is slightly bifid, blunt, and furnished with a fringe of bristles, the centre concave, and furnished posteriorly with two strong spines on each side at the base, between which is a row of smaller ones

Trachea of nearly uniform diameter throughout the rings, broad as far as its entrance into the thorax, afterwards rounded and narrow, with a large membranous space between them, they are arranged somewhat obliquely, as in the bulb found on the trachea of *Clangula vulgaris* Bone of divarication Y-shaped Upper bones of the bronchiæ are semicircular, the uppermost largest, the next being inclosed in its arc, the fourth is much flattened, thickest and broadest anteriorly, and with a prominent knob on its anterior extremity, from which it gradually tapers towards the posterior end, where it is somewhat falciform and suddenly narrowed to a point The next or fifth bone is also much flattened and straight for two-thirds of its length, when it also becomes suddenly falciform, with the point of the hook turned downwards

In addition to the usual sterno-tracheal muscles, this curious bird has two other pair, both of which have their origin on the rings of the trachea on each side, at the point where it enters the cavity of the thorax The anterior pair is inserted on the knobs at the extremities of the fourth bones of the bronchiæ, the posterior pair are also inserted on the bronchiæ, but on the three uppermost rings and on the posterior extremity of the fifth Besides these muscles, which are very strong, additional support is given to the portion of the trachea over which they extend by a tendon arising at the same point with the last-mentioned pair of muscles but between them and extending to the eleventh, twelfth and thirteenth rings of the bronchiæ, on each of which it is partially inserted this arrangement gives the bird a great power of shortening or lengthening that portion of the trachea over which the muscles extend

The œsophagus is small at the upper extremity slightly enlarged in the middle and towards the proventriculus, the coats of which are not much thicker than the œsophagus itself nor is it contracted at its entrance into the stomach The stomach is of moderate size, muscular, and has a large internal cavity, which was filled with seeds the remains of insects and small pebbles The epithelium, or membrane lining the stomach, hardened and rugose, particularly on the grinding surfaces, it measures 1¾ inch in length, and 1 inch in breadth

The total length of the intestinal canal, measuring from the pylorus to the cloaca, is about 3 feet 10 inches, that of the rectum 3¼ inches, the diameter of the duodenum is equal to that of the rectum, that of both being ¼ of an inch, the cæca are scarcely more than rudimentary, measuring only ½ an inch in length, the cloaca is of moderate size, and situated about 1 foot 7 inches above it, and attached to the small intestine is found the remains of the vitelline duct (*ductus vitello-intestinalis*)

The skeleton at first sight is chiefly remarkable for the large size and length of the bones of the legs and feet The sternum is long and narrow, measuring from the anterior extremity of the manubrial process 3 inches, and transversely, just behind the junction of the coracoids, where it is narrowest, $\frac{8}{10}$ths of an inch , its posterior margin is indented by two slight lateral fissures, between which it is much rounded and projects posteriorly , the lateral margins are slightly curved inwards , the broadest part of the sternum is near its posterior extremity, where it measures 1 inch and 4 tenths The indentation in which the lesser pectoral muscle lies is very deep, rises into a ridge on the lateral margin, and is continued from the junction of the coracoids about half-way along the sternum , the anterior edge of the keel is slightly curved backwards, the inferior edge is a little rounded and continued to the posterior margin of the sternum , the manubrial process is very long and bifurcate at its extremity , the coracoids are of moderate length and strength The os furcatum is light slightly flattened, arched, and with only a very small process at its sternal extremity The scapula is slightly falciform, of moderate length and size, reaching backwards to the third true rib The wing bones are short, but strong

The bones composing the pelvis are precisely what might be expected to be found in a bird possessing such a large tail, it measures 2 inches and $\frac{8}{10}$ths in length, and 1$\frac{7}{10}$ths in breadth , the iliac bones are broad, but form a lengthened process on each side of the caudal vertebræ for the attachment of the levator muscles of the tail The ischium is also broad, and placed nearly perpendicularly to the plane of the ilium The ischiadic foramina are large and rounded , the sides of the pelvis are much compressed from the point at which they penetrate to the posterior margin, the bones of the ilium being expanded beyond, and overshadowing, as it were, those of the ischium the os pubis is narrow and curved upwards beyond its second junction with the ischium The obturator foramen is of moderate size and oval , the cotyloid cavity for the reception of the head of the femur is deep and has the hinder portion of its upper edge very protuberant The ribs are eight in number, five true and three false two of the false ones are placed anteriorly and one posteriorly, the latter has a sternal rib attached, but it does not articulate with the sternum , the upper portions of the ribs next the vertebræ are much flattened, but they become thicker and narrower as they approach the appendage on their posterior margin, which is slightly turned upwards, and of moderate strength

The numbering of the vertebræ, as near as could be ascertained from a natural skeleton, is*, Cer 12 , Dor 6 , Sac 12 ? Caud 9 The lateral processes of the caudal vertebræ are much prolonged, particularly those of the last four but one, the terminal one is without any lateral process and nearly triangular

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* I have followed the same plan in the enumeration of the vertebræ here as I did in the 'Monograph on the Anatidæ, viz by considering all those which are anterior to the ribs and have no attachment to them, cervical, those anterior to the pelvinal bones and having ribs attached to them, dorsal , those which are anchylosed together immediately succeeding the dorsal, sacral , to some these ribs are sometimes attached and those immediately succeeding these, and not anchylosed to them, caudal

REMARKS —The extraordinary and doubtful structure of this bird is at once shown by the different places in which it has been arranged by authors, by Cuvier it is placed among the Passeres, by Lesson and Swainson among the Gallinaceous birds, and by Gray among the Grallatores The large and powerful legs which *Menura* possesses in such an eminent degree, has been doubtless the principal reason why it has been classed by the authors above-mentioned among Rasores and Grallatores, but on minute examination the scutellations of the tarsi will be found to differ from any of the typical birds in either of these orders, and to agree with that of the true Insessores Another very striking point in the external structure consists in the great length of the claws, their great strength, and in their being rounded and blunt at the points, and attached to toes of moderate size* Some of the *Rallidæ* possess lengthened claws, but they are sharp, in general weak and attached to long thin toes, therefore differing from *Menura* The *Alaudidæ* have the hind toe lengthened, but it is also weak and sharp, some of the *Cuculidæ* also have this structure, as the genus *Pelophilus*, in which the claws are not so much sharpened as in any of the preceding instances The genus *Pteroptochos*† has precisely the same form of claw as in *Menura*, and agrees with that genus in many anatomical peculiarities, nearly the only difference being that it has four fissures on the posterior margin of the sternum instead of two *Menura* appears to be nearly connected with *Megapodius*, and perhaps with *Alecthelia*, judging merely from external characters, but differs from *Talegalla, Chauna, Palamedea, Dicholophus, Psophia, Crax, Ourax, Ortalida, Penelope* and *Lophocerus*, with all of which it has been associated in the same family‡, in presenting an almost total difference in the structure of the tarsi and feet as well as in the form of the bill, which any one who has an opportunity of examining them, or even some of the best plates, will at once perceive

In the structure of the soft parts and digestive organs, *Menura* agrees with that of Insessores, and with many of them, especially with the genus *Grallina* of Vieillot, in the complicated muscular structure of the inferior larynx

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* On comparing the feet of *Menura* with those of Insessorial birds, they will not be found, exclusive of the claw, to be of a larger proportion to the size of the bird than many birds among Insessores

† For some account of the anatomy of this genus, see 'The Zoology of the Voyage of the Beagle,—Birds '—Appendix

‡ This family appears to be a sort of refuge for the destitute

The pelvis, as before remarked, is precisely of that form which might be expected to be found in a bird having powerful legs and a large tail, and therefore presents some similarity to the Rasores in this respect, but differs from that order in those portions of it not immediately connected with those parts, thus the obturator foramen in *Menura* is large, while in Rasores it is small or altogether obliterated, the extremity of the os pubis is turned upward, while in Rasores it is turned downward, in the former of these particulars it agrees with Insessores and Scansores, but in the latter with most of the Insessores

The structure of the sternum agrees with Insessores in having only two fissures on its posterior margin, but differs essentially from any birds I am acquainted with in that order in being much prolonged backwards and rounded between them The only approach to this structure that I am aware of is among the *Psittacidæ*, some of the Australian Ground-Parrots having nearly the same structure as *Pezoporus formosus* on the posterior margin, with this exception, that foramina take the place of fissures*

The os furcatum is slight, and destitute of any terminal process at its sternal extremity, in which respects it agrees with Scansores

The structure of the ribs, in being much broader above the posterior process, coincides both with many Insessores and Scansores, but this character is most marked in the latter order

Such is the mixed and doubtful character which *Menura* shows, but by far the strongest affinity is shown to Insessores, in which order this genus may form a family with *Pteroptochos*, and perhaps with *Alecthelia* and *Megapodius*†, bearing an affinity to Scansores Although a full account of the habits of this bird may be shortly expected from the pen of Mr Gould, I shall here remark, that what has hitherto been considered fabulous, namely, that this bird has the power of song, is far from improbable, considering the structure of its trachea and muscles Its affinity to Scansores is also, I think, explained by the great facility with which it scrambles or climbs over rocks and stumps*

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* These birds have also the claws and tarsi considerably lengthened Some resemblance to the posterior margin of the sternum of *Menura* is also found among the *Scolopacidæ*, in the Common Woodcock for instance, but the remainder of the skeleton is so totally unlike, that I cannot for a moment suppose that any degree of affinity exists

† I venture this opinion with very great doubt, nothing but an anatomical examination can decide the point, the habit appears to be different See Freycinet's Voyage, Zoologie, p 124

I have considered Scansores as distinct from Insessores throughout this paper, and think that ornithologists will, until more is known of the anatomy of birds than at present, find it convenient to class Birds in the following Orders, which may be distinguished in general by their skeletons — RAPTORES, VOLITORES (containing the Fissirostral groups), SCANSORES, INSESSORES, RASORES, CURSORES, GRALLATORES and NATATORES Perhaps the Pigeons also with advantage may be divided from the other RASORES

BIBLIOGRAPHICAL NOTICES

An Introduction to the modern Classification of Insects, founded on the Natural Habits and Corresponding Organization of the different Families By J O Westwood, F L S, &c 2 vols 8vo, with Figures London Longman and Co

No branch of natural science has made such extraordinary and rapid strides within the last few years in this country as the study of insects The contrast which it exhibits at the present day, compared with its state thirty years ago, is most striking *Then*, at the period when we commenced our entomological career, the literature of the science was most meagre and marrowless, we had, it is true, for our guides Stewart's 'Elements,' Marsham s 'Coleoptera,' Haworth s 'Lepidoptera' and the picture-books of Doudran, estimable works enough in their way, but from which the inquirer who wished to obtain more than a knowledge of the mere name of his species would not derive a particle of philosophy The minute investigations of the anatomist, the principles of natural classification founded upon the various relations of the different tribes and the variations in the metamorphoses of all insects, save the Lepidoptera, were subjects scarcely dreamt of and, in truth, the entomologist merited no other name than that of a collector, his only aim being the getting together of as great a number of species as possible, and storing them up in his cabinets

The appearance of the first two volumes of the 'Introduction' of Messrs Kirby and Spence placed the science on a far different footing showing the inquirer, in a most engaging manner, that it possessed far higher claims to his attention In these delightful volumes the natural history and œconomy of the insect tribes were proved to be as interesting and worthy of observation as those of the highest animals The subsequent appearance of the third and fourth volumes of the same work opened the wide field of insect anatomy and the principles of entomological classification, thus forming, with the preceding volumes, the most complete general 'Introduction' to the study hitherto published These were shortly followed by the appearance of Mr Curtis s beautiful work on the 'Genera of British Insects,' recently noticed in our pages, and by the 'Systematic Catalogue and Illustrations' of Mr Stephens the latter consisting of detailed descriptions of all the British species

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* See Collins's Account of New South Wales

Besides these, a very considerable number of minor treatises have been produced by authors who have in a great measure been instigated to the pursuit by the establishment of the various entomological societies, and whose works are scattered through the pages of numberless English and Foreign Transactions and other similar works During this period also the principles of natural classification have been greatly investigated both at home and abroad, but in no work have these principles being applied throughout to the numerous families of insects

The object of the present work may be best shown by the following passages from the preface to the first volume After noticing the distinction between the *general* nature of Introductions to Entomology and the *generic* and *specific* nature of the works of Curtis Stephens, etc , the author observes that the student has hitherto been "led at once from the *general views* he had gained on the subject to the minute technical details of *genera* and *species*, there being no work which he could take up to serve as a guide to the development of the principles of modern classification in the distribution of the *orders* and *families* For years this deficiency has strikingly manifested itself to me and it is long since I announced my present undertaking in which I had proposed to myself to show the application of the modern views which have been entertained relative to the natural relations of animals in the arrangement of the entire groups of winged insects , illustrating the subject by details of the natural habits, transformations and structure of the different families "

The work opens with a series of general observations upon the class of Insects, their general structure and transformations, and the various systems of Swammerdam, Linnæus, Fabricius, Latreille and MacLeay, the respective authors of the metamorphotic, alary cibarian, eclectic, and representative systems The arrangement adopted by the author nearly corresponds with that of MacLeay, the orders of Hexapod, Metamorphotic Insects (which are alone treated upon in this work) being divided into two parallel sub-classes Each order with its sections is then passed in review, ample details being given of the characters, structures, habits, transformations, and general distribution and relation of the different families, with an illustration of their characteristic anatomical details and preparatory states It is thus that the author has endeavoured to make his work a fitting 'Sequel' to the 'Introduction' of Kirby and Spence, whilst at the same time it will be found equally if not still more, useful to the student who would extend his inquiries beyond the details of genera and species in this respect it forms an equally fitting precursor to the works of Curtis, Stephens, etc A few extracts, however, will more satisfactorily show the manner in which the author has treated the subject in its various bearings, we will therefore take the distribution of the Coleoptera, which has lately been the subject of much discussion, as an example of the manner in which the *natural classification* of insects is treated After reviewing the arrangements of Linnæus Latreille, MacLeay, etc (that of the last-named author being founded upon the analogical relations of the preparatory states and the asserted inaccuracy of the tarsal system), the author observes, in addition to our ignorance of the larvæ of many important groups, " that Mr MacLeay himself admits the existence of a variation in the tarsal structure concurrent with the variation in the form of the larvæ a circumstance dependent as it seems to me, upon the principle that modifications of the preparatory states of an insect ought merely to be regarded as indications of corresponding peculiarities in the final state, the former modifications being subordinate to those observed in the imago, and having, in fact, been undergone with a direct view to the perfection of the insect We might indeed carry the subject still further Thus whilst the intimate connexion existing throughout the whole of the Tetramerous Beetles cannot be denied, yet Cerambyx has a subvermiform and Chrysomela an anopluriform larva, whilst the latter and Coccinella (Mr MacLeay's two examples of the Anopluriform Stirps), although agreeing in the larvæ, are totally different in the habits and in the structure of the tarsi of the imago ' After some further observations, he adds, that " The Coleoptera are therefore divisible into the four following sections 1 Pentamera, in which all the tarsi are 5-jointed, the fourth being of ordinary size 2 Heteromera, in which the four anterior tarsi are 5-jointed, and the two posterior 4 jointed, 3 Pseudotetramera (or Subpentamera, Tetramera, Latreille, Cryptopentamera Burm) in which the tarsi are 5 jointed, but the fourth joint is exceedingly diminutive and concealed between the lobes of the preceding, 4 Pseudotrimera (or Subtetramera Tetramera Latr, Cryptotetramera, Burm), in which the tarsi are 4 jointed, the third joint being very diminutive, and concealed between the lobes of the preceding "

As a specimen of the *structural details*, the following account of the structure of the mouth of the preparatory states of the May-fly (*Ephemera vulgata*) may be quoted —" Considering the rudimental nature of the mouth of the imago, it is surprising that no one has hitherto described the real structure of the mouth in the preparatory states Reaumur has attempted it but his figures are so rude and insufficient, that no idea can be gleaned as to their true structure, Swammerdam also passes them over undescribed In the pupa of *E vulgata* the upper lip is of moderate size, with the anterior angles rounded off and ciliated, it is flat and quite membranous the mandibles are horny, armed with several teeth within, near the base, which is dilated into a flattened molary plate, whilst the upper angle of the mandible is produced into a long curved horn The maxillæ are small, membranous, curved, pointed at the tip and internally setose the maxillary palpi do not extend beyond the front of the head, they are 4 jointed, the basal joint being very short the lower lip is very large and membranous covering the under side of the mouth it is quadrilobed and furnished within with a broad tongue, of which the anterior angles are produced and pilose the labial palpi are broad and 3-jointed "

The account of the proceedings of the Ant-lion may be taken as an example of the manner in which the *natural history* of the various families is treated —

" It is in very fine sand that the larva makes its pitfall When placed upon the surface, it bends down the extremity of the body, and then pushing, or rather dragging itself backwards by the assistance of its hind legs but more particularly of the deflexed extremity of its body, it gradually insinuates itself into and beneath the sand, constantly throwing off the particles which fall upon, or which it shovels, with its jaws or legs upon its head, by suddenly jerking them backwards,

Ossaque post tergum magnæ jactata parentis '

" Proceeding in this manner, in a spiral direction, it gradually diminishes the diameter of its path, and by degrees throws so much of the sand away as to form a conical pit at the bottom of which it then conceals itself its mandibles, widely extended, being the only parts that appear above the surface with these, any luckless insect that may happen to fall down the hole is immediately seized and killed When the fluids of the victim are exhausted the Ant-lion, by a sudden jerk, throws the dry carcass out of the hole should, however, the insect by chance escape the murderous jaws of its enemy, the latter immediately commences throwing up the sand, whereby not only is the hole made deeper and its sides steeper, but the escaping insect is probably hit, and again brought down to the bottom of the pit It is chiefly upon ants and other soft-bodied insects that these larvæ feed They are, however capable of undergoing long fasts for one of my larvæ remained from October till March without food It has been supposed that, as the food of these larvæ consists entirely of juices, and as they appear to be destitute of anal aperture, the whole of their food is assimilated M L Dufour has, however, traced the intestinal canal terminating in an anus, which is, indeed, very difficult to discover (Ann Soc Ent de France tom ii p 67 App) Latreille states that these larvæ are produced in the summer or autumn and become pupæ in the following spring I found the larvæ of all sizes in July one of which became a pupa, and assumed the perfect state , whilst another, of equal size, remained through the winter in the larva state Previous to assuming the pupa state, the larva forms a globular cocoon of less than half an inch in diameter of fine sand, glued with silken threads spun from a slender telescopic-like spinneret placed at the extremity of its body, and lined with fine silk The pupa is small, not being half an inch long inactive, and with all its limbs laid at rest upon the breast When ready to assume the perfect state it uses its mandibles, which are quite unlike those of the larva and imago, and which have not been before described, to gnaw a hole through the cocoon, and pushes itself partly through the aperture, in which it leaves the pupa skin "

The work is illustrated with a coloured plate, containing examples of most of the orders, and by nearly 2500 figures representing the types of the different families, with their preparatory states and structural peculiarities there being not fewer than 340 figures of perfect insects and more than 420 of larvæ and pupæ Another important feature in the work, and one which we can well believe must have cost the author very great labour, is the bibliographical references to each of the families These cannot fail to be of infinite service to the student, as they contain notices of every paper or detached memoir of the least value published on the subject up to the date of the work At the same time, in order to render it still more useful, a complete synopsis of the British genera, brought down to the present time is added and in which are included the characters, synonyms, and authorities of the genera the number of British species, and name of the type with a reference to a figure of the genus Having thus given our readers an insight into the comprehensive nature of the work before us, we must observe, that the discussion of the relations of the different families, and of the views entertained thereof by preceding writers, appears too much detailed The great extent of the subject however, and the comparatively slight grounds existing towards a perfect classification of the very numerous tribes of insects, have necessarily involved many of their relations in doubt, and of which the discussion cannot fail to be productive of advantage We also notice a few typographical errors, some of which, however, are corrected in the Appendix In conclusion, as this work has the rare merit of interfering with no other hitherto published, we cordially recommend it as one rendered necessary by the progress of the science and as the result of the most laborious research, and consequently as deserving both from its nature and execution of becoming a standard work of reference in every zoological library

Otia Hispanica Auctore P B Webb Pentas 2, 1839

The present number of this valuable work, which has only recently reached us, is occupied by figures and descriptions of five species of Algæ, by C Montague, M D and as they are all either new or but little known, we cannot do better than transcribe their specific characters we must, however previously state that each of the species is fully illustrated by magnified dissections, and by a detailed description and copious observations

1 *Griffithsia flabellata* (Montag), filis setaceis virgatis, ramis alternis pinnatis, pinnis tandem divaricato-recurvis, pinnulis subsecundis erectis, articulis diametro quintuplo duplo longioribus, capsulis maximis involucratis —Ceramium et Callithamnion flexuosum *Agardh*

Agardh appears never to have seen the fruit of this plant, and therefore referred it to *Callithamnion*, to which genus it is closely allied in general appearance Its fruit is that of a *Griffithsia*

2 *Griffithsia Schousboei* (Montag), repens, intricata filis dichotomis articulato-constrictis, articulis elliptico-sphæricis e geniculis radicellas hyalinas emittentibus

' The absence of fructification causes me to doubt if this is not an abnormal state or a rampant variety of *G corallina* (Ag) "

3 *Gigartina conferta* (Schousb) fronde cartilaginea, filiformi, vage ramosa ramis fasciculatis confertis, ramulos abbreviatos patentes apice incrassato-ovoideos undique emittentibus

4 *Gigartina gaditana* (Montag), fronde cartilaginea, filiformi, dichotoma, aculeis simplicibus brevissimis subsecundis utrinque attenuatis obsita

Probably closely allied to the *Sphærococcus armatus* (Agardh)

5 *Delesseria interrupta* (Ag), fronde membranacea tenerrima, interrupte costata, lineari, dichotoma, apice furcata rotundataque

This second number fully supports the high character which had been obtained by its predecessor, and we trust that the work will receive that support which it deserves from the botanists of Britain

PROCEEDINGS OF LEARNED SOCIETIES

ZOOLOGICAL SOCIETY

June 23, 1840 —William Yarrell, Esq V P in the Chair

The Rev F W Hope read a paper entitled " Observations on the *Stenochoridæ* of New Holland, with descriptions of new species

Of this paper the following is an extract —

Fam STENOCHORIDÆ Leach

Type of the family *Stenochorus semipunctatus*, Fab

Section 1 *Armigeri*

Antennis thoraceque spinosis, apicibus elytrorum bidentatis

Sp 1 STENOCHORUS GIGAS *Sten ater thorace spinoso inæquali elytris basi nigro flavoque variegatis*

Antennæ corpore fere duplo longiores, articulis ternis primis nigricantibus, reliquis fusco-ferrugineis, articulis intermediis apice spinosis Caput atrum antice rufo-ciliatum palpis ferrugineis Thorax utrinque spinosus spinis brevibus, tuberculatus, rugosus et ater Elytra bidentata, basi nigro flavoque variegata, varioloso-punctata Corpus infra nigrum abdomine postice piceo, femoribus atris tibiis tarsisque fusco-brunneis et tomentosis

Long lin 18½, lat lin 5½

Hab In interiori parte Novæ Hollandiæ

This magnificent species, the largest of the genus, was given to Captain Roe, when engaged on his survey of the Australian coast, it was labelled as coming from the inner country

In Museo Dom Hope

Sp 2 STENOCHORUS LATUS *Sten fusco-brunneus, thorace cinereo-*

tomentoso, elytris flavo brunneoque variegatis Caput cinereum Antennæ longitudini corporis vix æquales Thorax utrinque spinosus, spinis acutis tomentosus et rugosus antice binis tuberculis rubro-piceis insignitus Elytra flavo-brunnea maculisque nigris variegata, macula suturali magna lunulata, ad apicem posita corpus infra nigrum, pectore pedibus brunneo piceis tarsisque auricomatis

Long lin 15, lat lin 4

Hab In Nova Hollandia circa Flumen Cygneum

In Mus Dom Hope

Sp 3 STENOCHORUS LONGIPENNIS, *Sten atro brunneus, thorace cinereo elytris antice flavo variegatis postice piceo-brunneis Antennæ longitudine corporis fusco-flavæ et tomentosæ Thorax utrinque spinosus spinis acutis, ad humeros elytrorum curvatus rugosus, tuberculo nigro et glabro in medio disci posito Elytra elongata ad apicem parum attenuata, antice brunnea lineis flavis longitudinalibus variegata, postice reliqua parte disci atro-brunnea Corpus infra fusco-brunneum femoribus tibiis pallidioribus et tomentosis tarsisque auricomatis*

Long lin 13, lat lin 3½

Hab Van Diemen s Land

Sp 4 STENOCHORUS MITCHELLI *Sten straminicolor, caput nigrum antennis flavis thorace atro cinereo elytrisque flavo brunneoque variegatis Caput atrum thorace bispinoso spinis utrinque minutis disco rugoso atro-cinereo Elytra pallide flava sutura brunneisque maculis variegata Corpus infra rubro brunneum annulis abdominis aurato tomentosis femoribus et tibiis concoloribus tarsisque aurato spongiosis*

Long lin 12, lat lin 3¼

Hab In Nova Hollandia

This singularly marked insect I have named in honour of Sir T Livingston Mitchell, the author of one of the most interesting works which has yet appeared respecting Australia

Sp 5 STENOCHORUS TRIMACULATUS *Sten pallide flavus, antennis pedibus luteis thorace cinereo elytrisque nigro maculatis Caput piceo brunneum Antennis flavis sparsimque tomentosis Thorax utrinque spinosus, spinis brevibus rugoso-tuberculatus et argenteo-cinereus scutellum flavum Elytra ad basin nigra macula magna ovali pallide flava, ante apicem in singulo posita Corpus infra rubro fuscum et argenteo-tomentosum Pedibus luteis*

This elegant species I received from Captain Roe, it was captured at the Swan River Settlement

Sp 6 STENOCHORUS OBSCURUS, *Donovan Sten thorace rugoso spinoso, fuscus elytris antice punctato-rugosis, postice lævibus nitidis apice bidentatis*

Long lin 11, lat lin 3

This species appears to be of rare occurrence I have seen only three specimens, all of them were from Van Diemen s Land

Sp 7 STENOCHORUS PUNCTATUS, *Donovan* *Sten thorace spinoso, fuscus, elytris punctatis antice subrugosis, apice bidentatis maculis tribus flavis*

Long lin 11, lat lin 2½

This species I obtained at the sale of the late Mr Donovan's insects it was labelled as received from Van Diemen's Land The colour of this species in Donovan's plate is not dark enough, the variety with the basal and medial spots united on the elytra is by no means uncommon, the species is also liable to vary considerably in size, a small specimen measured only 8½ lines long and 2 in width

Sp 8 STENOCHORUS SEMIPUNCTATUS, *Fabricius* *Sten thorace spinoso, fuscus, elytris antice punctato-rugosis, flavo-fasciatis, postice lævibus, apice bidentatis macula flava* Vid Oliv 4—67 p 37, 48, Stenoch 69 tab 2 f 19, Enc Méth 5 p 303, 56, Schonherr Syn Ins vol i part 3 p 404 species 9

Long lin 11, lat lin 3

The localities of 'Brasilia' and 'Nova Hollandia' are mentioned by the latter author, there cannot exist a doubt that the former locality is erroneous The species is subject to great variation I mention some of the most particular

Var α *Elytris (long lin 8, lat lin 1¾) mediis trimaculatis, maculis binis antice parvis, postica triplo majori*

Var β *Elytris (long lin 7, lat lin 1½) late flavo-fasciatis maculis nigris aspersis*

Var γ *Elytris (long lin 11, lat lin 3) late flavo-fasciatis nigris binis maculis notatis, apice late flavo, spinisque concoloribus, antennis pedibusque pallidis*

This is probably an immature specimen It is by no means uncommon

Sp 9 STENOCHORUS ANGUSTATUS, *DeJean* *Sten valde elongatus, parallelus, pubescens, fusco-cinereus, thorace subplicato, conico, lineis duabus albidis Elytris macula laterali antica, elongata, fusca*

Long lin 10, tot 15

In Museo M M DeJean et Gory

The above description is taken from the Voyage De l'Astrolabe, by Mons Boisduval vide part 2 p 475

Sp 10 STENOCHORUS UNDULATUS *Sten nigro-brunneus antennis aurato-tomentosis thorace supra tuberculato et concolori, medio disci macula elevata rubro-picea et polita Scutellum aureo-tomentosum Elytra fusco-brunnea fasciis binis mediis undulatis pallide flavis apicibus concoloribus Corpus infra rubro-piceum pedibus aureo-tomentosis*

Long lin 10, lat lin 2½

This species inhabits New Holland, and was sent me by Captain Roe from the New English Settlement at the Swan River in Australia I must remark that in this species the spines at the apex of the elytra appear unusually short, those at the suture are scarcely perceptible I imagine therefore, as the insect is unique and much damaged, that probably they have been broken off

Sp 11 STENOCHORUS ASSIMILIS *Sten affinis præcedenti, rufo-brunneus, antennis concoloribus et tomentosis Thorax-rufo-piceus, supra tuberculatus tuberculis quinque elevatis majoribus ita dispositis* | *reliquis minoribus Elytra rufo-brunnea, fascia elongata irregulari undulata et flava apicibus flavo-maculatis Corpus infra rufum femoribus et tibiis concoloribus et sub-tomentosis tarsisque auricomatis*

Long lin $10\frac{1}{2}$ lat lin $2\frac{1}{2}$

I received this insect from Van Diemen's Land

Sp 12 STENOCHORUS ACANTHOCERUS, MacLeay *Sten fusco-ferrugineus capite punctato, antennis rubris, articulo* 3^{tio} 4^{to} 5^{to} *et* 6^{to} *apice spinosis, ore rubro, maxillis elongatis, apice ciliatis membranaceis, palpis securiformibus, thorace obscuro utrinque unispinoso margine antico tuberculisque dorsalibus utrinque posticoque semicirculari rubris, scutello rubro, elytris rubris fasciis tribus nigris undatis, ad basin inter lineas elevatas subcrenatis, apicemque versus punctatis, apice bidentatis, corpore subtus nigro nitido tomentoso pedibus rubris*

In Mus Dom MacLeay

Sp 13 STENOCHORUS DORSALIS, MacLeay *Sten fulvo-piceus capite angusto labro palpisque testaceis, vertice canaliculato, thorace inæqualiter rugoso eminentia media ovali glabra tribusque aliis utrinque inconspicuis, elytris bidentatis subelevatis interstitiisque punctatis macula media suturali testacea antice subemarginata, antennis subtus villosis, articulis apice haud spinosis, corpore pedibusque piceis, femoribus incrassatis*

In Mus Dom MacLeay

Hab In Nova Hollandia

Section 2 *Tubericolles*

Antennis spinosis, thorace tuberculato haud spinoso, apicibus elytrorum bidentatis femoribusque incrassatis

Sp 14 STENOCHORUS UNIGUTTATUS, MacLeay *Sten fuscus capite cum antennis villosis, thorace inæquali rugoso, tuberculato Elytris depressis crebrissime punctulatis, in singulo macula quadrato-elongata, et lutea fere in medio disci posita Corpus infra rubro-fuscum tomentosum femoribus incrassatis et concoloribus, tarsis infra flavo-spongiosis*

This species I received from the Swan River it is subject to great variation in size A specimen similar to Mr MacLeay s *Uniguttatus* measures in length lin $10\frac{1}{2}$, lat lin 2 It seems likely that *Sten elongatus* of DeJean is the same as the above species

Sp 15 STENOCHORUS RHOMBIFER *Sten affinis præcedenti at multo minor Fuscus, antennis et corpore sparsim flavo-tomentosis, capite haud villoso, rubro Thorax inæqualis et tuberculatus Elytra depressa bidentata, macula quadrato-elongata lutea fere*

in medio disci posita   Corpus infra rubro-piceum nitidum, binis ultimis segmentis pallidioribus   Pedes rubro-fusci femoribus parum incrassatis tarsisque infra aureo-tomentosis

Long lin 7 , lat lin 1¼

I received this species in a box of insects from Mr Charles Darwin   Its true locality is either Sidney or Van Diemen's Land

I consider it quite distinct from Mr Sharpe MacLeay's *Stenochorus uniguttatus*

In Mus Dom Hope

Sp 16 STENOCHORUS TUNICATUS, MacLeay *Sten flavus antennarum articulis duobus primis nigris quinto apice septimo nonoque nigris, thorace subcylindrico utrinque unidentato, supra quadrituberculato tuberculis anticis majoribus, elytris apice flavis unidentatis, parte basali ultra medium subviolaceo-flava linea obliqua terminata, corpore pedibusque flavo-testaceis*

In Mus Dom MacLeay

Sp 17 STENOCHORUS RUBRIPES, Boisduval *Sten elongatus parallelus, antennis pedibusque rufis, thorace angustiori, cylindrico, tuberculato, coleopteris dilute fuscis, apice spinosis, punctis crebris impressis, macula communi maxima irregulari, nigra notata, altera postica, scutelloque flavis*

Long lin 10½, lat lin 2½

Described from Mons Boisduval s ' Voyage de l Astrolabe,' vid part ii page 479   I had given the name of *Undulatus* to the species, and had figured it before I was aware of its being described   the sexes apparently differ considerably in size

Sp 18 STENOCHORUS ROEI   *Sten rubro fuscus, antennis pallidioribus, thorace tuberculato, elytrisque macula irregulari flava notatis, alteraque apicali lutea, spinis apice brevibus, externo longiori   Corpus infra rubro piceum nitidum pedibus concoloribus et tomentosis*

Long lin 6¼, lat lin 1¼

This species was sent to me from the Swan River by Captain Roe   it is named after that indefatigable and enterprising officer

Section 3   *Fissipennes*

Antennis spinosis, thorace inæquali tuberculato seu denticulato, apicibus elytrorum transverse truncatis, haud spinosis

Gen   COPTOCERCUS[*], Hope, Nov Gen

Caput antice rugosum, antennis spinoso-tomentosis   *Thorax* fere cylindricus, tuberculatus   *Elytra* parallela thorace latiora ad apicem parum contracta, transverse fissa, haud spinosa   *Corpus* infra convexum, antennis pedibusque fere ut in *Sten Roei* conformatis

Type of the Genus, *Stenochorus biguttatus* of Donovan

Sp 1   COPTOCERCUS BIGUTTATUS, Donovan, vid pl 2 fig 7

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[*] Koptocercus, from *κοπτω, scindo,* and *κερκος cauda*

Copt biguttatus, thorace mutico, ferrugineus, elytris antice punctato-rugosis, testaceo-maculatis, bidentatis macula flava

Long lin 8, lat lin 2

I received this insect from Mr Donovan and therefore have no doubt respecting the individual species The elytra, according to the above description, can scarcely be considered as bidentate they appear as if they were abruptly broken off at their apex The sexes vary very much in size

Sp 2 COPTOCERCUS SEXMACULATUS *Copt niger, antennis brunneis, thorace tuberculato et rugoso, elytris 6 maculis luteis notatis, pedibus rufescentibus Caput atrum antennis brunneis Thorax utrinque denticulatus, inæqualis, rugosus, tuberculatus, macula media elevata et glabra Elytra nigra antice varioloso-punctata, postice punctis minoribus Sex-maculata, macula* 1ma *lutea paullo infra basin,* 2da *fere media seu melius fasciata,* 3^{tia} *apicali pallidiore Corpus infra cinereo-piceum, pedibus rufo-brunneis*

Long lin 7, lat lin $1\frac{3}{4}$

This species, which appears to have escaped the notice of entomologists is abundant I suspect that the male sex will have the denticulation on each side of the thorax more marked than in the female described

Sp 3 COPTOCERCUS UNIFASCIATUS *Copt ater thorace inæquali tuberculato, elytris nigris punctatis, et flavo-fasciatis, punctis ternis, maculisque minutis in singulo, inter basin et medialem fasciam positis Corpus infra rubro-piceum, pedibus concoloribus, aureo tomentosis, abdomine nigro, et nitido*

Long lin 6, lat lin $1\frac{1}{2}$

The above insect I received from Captain Roe, of the Swan River Settlement in New Holland

Section 4 *Denticolles*

Antennis tomentosis thorace utrinque spinoso, dorso dentato, elytris apice obtusis

Gen TRACHELORACHYS*, Nov Gen

Type of the Genus *Stenochorus fumicolor*

Caput exsertum, oculis prominentibus, antennis corpore brevioribus *Palpi* maxillares mandibulis longiores *Antennæ* 11 articulatæ, 1mo cylindrico parum deformi ad basim tenuiori et externe crassiore, 2do brevi subcyathiformi reliquis fere æqualibus, at extimo minori, apice attenuato *Thorax* convexus utrinque spinosus, disco spinis armato *Elytra* thorace quadruplo longiora, depressa, ad apicem obtuse rotundata et inermia *Pedes* simplices, femoribus haud incrassatis

Hab In Nova Hollandia

TRACHELORACHYS FUMICOLOR *Trach fusco niger, thorace utrinque spinoso, disco spinis quatuor fere in medio armato Elytra parallela marginibus undique elevatis ad basim crebre granu-*

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* The above word is formed of τραχηλος, *collum*, and ραχις, *a spine*

lata, granulis ad apicem e medio elytrorum magnitudine decrescentibus Corpus infra piceo-nigrum, pedibus pallidioribus et tomentosis, plantisque aurato-tomentosis

Long lin $10\frac{1}{2}$, lat lin $2\frac{1}{2}$

This insect was obtained from a collection made in the vicinity of Sydney

TRACHELORACHYS PUSTULATUS *Trach flavo-fuscus antennis tomentosis, thorace concolori utrinque spinoso, spinis binis fere in medio armatis Elytra marginata, pustulis nigris in lineis sparsim dispositis Corpus infra fusco-rubrum, pedibus subtomentosis*

Long lin 8 lat lin $1\frac{1}{2}$

The above insect was purchased out of a New Holland box, along with various nondescripts, most likely they were from Hobart Town

Section 5 *Femorales*

Antennis tomentosis, thorace utrinque spinoso, dorso dentato elytris transverse sectis, femoribus incrassatis

Gen MEROPACHYS*

Caput exsertum, antennis tomentosis articulis undecim articulatis 1^{mo} fere ut in *Trach fumicolori*, at externe crassiori et ovato 2^{do} brevi et globoso, 3^{tio} triplo longiori 4^{to} paullo breviori reliquis gradatim increscentibus extimo apice subacuto *Thorax* antice et postice contractus utrinque in medio spinosus dorso dentato *Elytra* depressa, thorace latiora postice latiora transverse fissa *Totum corpus* supra et infra argenteo sericie aspersum *Femoribus* valde incrassatis in medio fortiter globosis

MEROPACHYS MacLeaii *Merop fusco-flava antennis flavis tomentosis, thorace concolori, utrinque spinoso, maculis binis atris, antice et postice signato Elytra aurato sericie aspersa, ad humeros tuberculata, fascia nigricanti ante apicem posita Corpus infra rubrum nigro et argenteo variegatum Pedes flavescentes, femoribus globosis, nigro-maculatis, tibiis quatuor posticis medio atratis, tarsisque pallidis binis anticis fere omnino nigris subtusque auri-comatis*

Long lin 8, lat lin $1\frac{1}{2}$

This beautifully sericeous insect is named in honour of William Sharpe MacLeay, Esq, from whom we may shortly expect some valuable communications relating to the entomology of Australia

This genus appears to differ chiefly from *Tracheloracchys* in having both the sexes remarkably characterized by their incrassated femora and it is probable that, as in other New Holland Stenochoridous genera the length of the antennæ will vary in the sexes

MEROPACHYS TRISTIS *Merop flavo fuscus antennis tomentosis, thorace aurato lanugine obsito Elytra depressa, minutis pustulis lineari serie insignitis Corpus infra rubro-piceum sericie*

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* Meropachys is from *μηρος, femur*, and *παχυς, crassities*

aurato tectum Femora valde incrassata, tibiis rubro-testaceis, tarsisque infra auri-comatis

Long lin $9\frac{1}{4}$ lat lin 2

The above species was sent to me by Captain Roe from the vicinity of the Swan River settlement There were also other species allied to the present, but they arrived in too mutilated a state to describe

CONICOLIDES

Scolecobrotus Westwoodii This species was described at p 109 in the first volume of the Zoological Transactions, and is admirably figured at Plate XV *n* 5 It is remarkable for the joints of the antennæ all excepting the first three appearing as if they were eaten by worms I have lately obtained from Mr Fortnum the other sex of this singular insect, and now briefly describe it The antennæ are of a light coral red colour, which may partly be occasioned by abrasion The joints of the antennæ do not appear serrated as in the former sex, excepting under a high magnifying power and even then it is scarcely perceptible The spines at the apex of the elytra are wider apart than in the specimen previously described in other respects the insects accord almost entirely I have reason to think that both the above specimens are from the Swan River settlement and am not aware that any others are to be found in our metropolitan, or even in the French collections

Uracanthus Hope For the description of this genus *vide* the details published at page 108 of the Zoological Transactions,' where only one species was described, two more are now added

URACANTHUS PALLENS *Uracan affinis præcedenti at multo minor Cervino-brunneus thorace conico et albo lineato, elytris pallidioribus apicibus bidentatis*

Caput fronte forte canaliculata pubescenti albida tectum Thorax alba linea utrinque notatus, binisque tuberculis ad latera subarmatus, rugisque transversis constrictus Elytra cervino-brunnea, sericea, triangulis in singulo colore saturatiore inquinatis Corpus infra brunneo-sericeum, femoribus parum compressis

Long lin 10, lat lin 2

I had originally given the name of *sericeus* to this species, which as it seems common to all that are now known, I change it at present to *pallens* It was received from Van Diemen's Land in 1839

URACANTHUS MARGINELLUS *Uracan fusco-brunneus thorace albolineato, elytrisque brunneo marginatis*

Totum corpus supra tomentosum, capite porrecto et inter oculos parum sub-canaliculato Thorax rugis constrictus, tuberculo utrinque posito Elytra albo-pubescentia marginibus br[illegible]s apicibus abrupte truncatis, spinis parum prominentibus [illegible]pus infra concolor, femoribus compressis

Long lin 9 lat lin $1\frac{1}{3}$

I received this insect from Captain Roe, of the Swan River In form it approaches a singular genus named *Stephanops* by Mr Shuckhard, it is however decidedly an *Uracanthus,* and there can be little doubt that *Stephanops Nasutus* of the above author belongs to my section of the cone-necked shaped *Stenochoridæ*

Section *Conicolles,* Hope

Genus Strongylurus, Hope

Type of the Genus *Sten scutellatus* Hope
Vide Zool Trans, vol i p 107

Caput porrectum, oculis prominentibus *Antennæ* undecim articulatæ articulus 1^{mus} crassus antice latior quam ad basim 2do brevi reliquis gradatim increscentibus compressis *Thorax* coniformis antice et transverse truncatus *Elytra* thorace latiora, parallela apicibus rotundatis *Femora* in utroque sexu subincrassata, et parum compressa

Sp 1 Strongylurus scutellatus *Strong fuscus et tomentosus, thorace flavo ochraceo colore utrinque lineato medio disci nigricante Scutellum valde distinctum flavum Elytra fusco brunnea, fasciisque undulatis parum distinctis notata Corpus infra sordide fuscum, abdomine rubro piceo, pedibus concoloribus et tomentosis*

Long lin $12\frac{1}{4}$ lat lin 3

The above insect I have received from various parts of New Holland as it is accurately figured, I have not given very full generic details I must remark however that in the sexes of this genus the antennæ vary very considerably in one instance exceeding the length of the body, whilst in the other sex they are shorter than the elytra These Longicorn beetles also vary much in size, which is a remark that appears to apply to most of the *Cerambycidæ* of New Holland Can the long drought which sometimes prevails in this country be regarded as the cause of *dwarfishness* which is certainly one of the striking features of the *Coleoptera* of Australia ?

Sp 2 Strongylurus varicornis *Strong testaceo-fuscus antennis flavo nigroque variegatis Thorace tomentoso utrinque, dentibus atris armato Scutellum distinctum et album Elytra fusco-testacea fasciis binis undatis parum distinctis Corpus infra concolor, pedibus tomentosis*

Long lin $5\frac{1}{3}$, lat lin $1\frac{1}{2}$

There are in our English collections two other species belonging to this genus, as however I have them not at hand, I must leave others to describe them

Genus Coptopterus, Hope

Type of the Genus *Stenochorus Cretifer,* Hope
Vide Zool Trans, vol i p 107

Caput porrectum inter oculos canaliculatum *Antennæ* compressa, et fere ut in Strongyluro *Thorax* obconico-truncatus, lateribus rotundatis *Elytra* thorace latiora parallela, apicibus sub oblique truncatis, seu abrupte sectis *Femora* sub-incrassata et parum compressa, tibiis subincurvis

Coptopterus cretifer *Copt fusco brunneus, capite albida macula inter oculos posita Thorax nigro cinereus variis maculis cretaceis notatus Elytra brunnea maculis nigris aspersa, in quibusdam speciminibus maculæ conjunctæ fascias exhibent Corpus infra fusco-rubrum maculisque variis albidis obsitum Pedes rubro picei et tomentosi*

Long lin 10½, lat lin 3

This insect appears to be abundant at Sydney there are also other allied species undescribed, and from the vicinity of the Swan River

Genus Piesarthrius Hope

Type of the Genus *Stenochorus marginellus*
Vide Zool Trans, p 112 Genus 12

Caput exsertum *Antennæ* valde compressæ 11-articulatæ *Thorax* fere tetragonus angulis anticis parum rotundatis *Elytra* thorace paullo latiora parallela interne spinosa angulis externis rotundatis *Femora* antica quatuor vix incrassata posteriora minora, tibiis subincurvis

Hab In Nova Hollandia

Piesarthrius marginellus *Piesar flavo-fuscus antennis compressis, tomentosis et pallidis Thorax niger, lateribus flavo ochraceis Scutellum distinctum et flavum Elytra testaceo flava marginibus inte[illegible]e et externe rubro-piceis Corpus infra brunneo-piceum lateribus pectoris annulisque abdominis utrinque flavo-maculatis, pedibus pallidioribus*

Long lin 10, lat lin 2½

This insect I received from Captain Roe of the Swan River and it is, I believe unique in our London cabinets I have seen a second species, but have not been able to obtain permission to describe it

GEOLOGICAL SOCIETY

April 29, 1840 —A paper was read, entitled, "Description of the remains of a Bird, Tortoise, and Lacertian Saurian, from the chalk," by Richard Owen, Esq, F G S

Bird—The three portions of Ornitholite were obtained by Lord Enniskillen from the chalk near Maidstone, and were recognised by him and Dr Buckland as belonging to some large bird One of the bones is nine inches in length, and has one extremity nearly entire, though mutilated, but the other is completely broken off The extremity, partially preserved, is expanded The rest of the shaft of the bone has a pretty uniform size, but is irregularly three-sided, with the sides flat and the angles rounded its circumference is two inches and a quarter The whole bone is slightly bent The specimen differs from the femur of any known bird, in the proportion of its length to its breadth, and from the tibia or metatarsal bone, in its triedral figure, and the flatness of the sides, none of which are longitudinally grooved It resembles most the humerus of the Albatross in its form, proportions and size, but it differs in the more marked angles bounding the three sides The expanded extremity likewise resembles the distal end of the humerus of the Albatross, but it is too mutilated to allow the exact amount of similarity to be determined

On the supposition that this fragment is really a part of the humerus, Mr Owen says, its length and comparative straightness would prove it to have belonged to a longipennate natatorial bird, equalling in size the Albatross

The two other portions of bone have been crushed, but Mr Owen states that they belong to the distal end of the tibia, the peculiar strongly-marked trochlear extremity of which is well preserved Their relative size to the preceding bone, supposing that specimen to be part of a humerus, is nearly the same as in the skeleton of the Albatross There is no bird now known north of the Equator with which the fossils can be compared

Tortoise—The remains of the Chelonian Reptile consist of four marginal plates of the carapace, and some small fragments of the expanded ribs The marginal plates are united by the usual finely-indented sutures, and each is impressed along the middle of its upper surface with a line corresponding to the margin of the horny plate which originally defended it The external edge of each plate is slightly emarginated in the middle These plates are narrower in proportion to their length than in any of the existing marine Chelonia and they deviate still more in the character of their internal articular margin, from the corresponding plates of terrestrial Chelonia but they sufficiently agree with the marginal plates of the carapace of the Emydes, to render it most probable that these cretaceous remains are referable to that family of Chelonia which live in fresh water or estuaries

Lacertian Saurian—This fossil belongs to the collection of Sir Philip Egerton, and it consists of a chain of small vertebræ in their natural relative position, with fragments of ribs and portions of an ischium and a pubis

The bodies of the vertebræ are united by ball and socket-joints, the socket being on the anterior and the ball on the posterior part of the vertebra and they are further proved to belong to the Saurian class of reptiles by the presence of many long and slender ribs, as well as by the conversion of two vertebræ into a sacrum, in consequence of the length and strength of their transverse processes The remains of the ischium and the pubis are connected with the left side of the sacrum, proving incontestably that this reptile had hinder extremities as well developed as in the generality of Saurians Of these extremities, as well as of the anterior and of the head, there are no traces

Mr Owen then proceeds to determine to which division of Saurians, having ball and socket vertebral joints, the fossil should be referred In the crocodilian or Loricate group, the transverse costigerous processes are elongated, and three, four, or five of the vertebræ which precede the sacrum are ribless, and consequently reckoned as lumbar vertebræ in the lacertian Sauriæ there are never more than two lumbar vertebræ, and those which have ribs support them on short convex processes or tubercles

In the fossil from the chalk, the ribs are articulated with short processes of the kind just mentioned, resembling tubercles, and they are attached to the sides of the anterior part of all the vertebræ, except the one immediately preceding the sacrum These characters, Mr Owen says, in conjunction with the slenderness and uniform length of the ribs, and the degree of convexity in the articular ball of the vertebræ, prove incontestably, that the fossil is part of a Saurian, appertaining to the inferior or lacertian group

The under surface of the vertebræ is smooth, concave in the axis of the spine, and convex transversely As there are twenty-one costal vertebræ anterior to the sacrum, including the single lumbar, the fossil, Mr Owen observes, cannot be referred to the genera *Stellio*, *Leiolepis*, *Basiliscus*, *Agama*, *Lyriocephalus*, *Anolis*, or *Chamæleon*, but that a comparison may be instituted between it and the *Monitors*, *Iguanas*, and *Scinks* In conclusion, he states that in the absence of the cranium, teeth, and extremities any further approximation of the fossil would be hazardous, and too conjectural to yield any good scientific result

June 10 1840 —A memoir descriptive of a ' Series of Coloured Sections of the Cuttings on the Birmingham and Gloucester Railway by Hugh Edwin Strickland Esq , F G S

The author commences by expressing his regret at the irrecoverable loss which science has experienced in full advantage not having been taken of the valuable geological information, which has been exposed by the railway cuttings in different parts of England during the last ten years and he suggests the propriety of each line of railway being systematically surveyed by a competent observer while the cuttings are in progress

Anxious to contribute towards so desirable an end Mr Strickland gladly yielded to a request made to him by Captain Moorsom, the chief engineer of the Birmingham and Gloucester Railway to undertake a geological survey of the line, and he expresses his obligations to that gentleman and to Captain J Vetch for the valuable assistance they afforded him The line was originally surveyed by Mr Burr, when only the trial shafts had been sunk, and before the cuttings were commenced, but Mr Strickland bears testimony to the accuracy of the account which Mr Burr laid before this Society —(Geol Proceedings vol ii p 593

The direction of the railway ranges nearly parallel to the strike of the strata, and therefore intersects only the new red sandstone and red marl, the lias, and superficial detritus

New red sandstone and red marl —The lowest rock exposed belongs to the new red or bunter sandstone resting on the anticlinal axis of the Lickey, ten miles south south west of Birmingham and one mile south of the termination of the altered rock, or Lickey Quartz*. The sandstone is there thick bedded, soft, and red and dips on the western flank about 5° west-south west, and on the eastern 5° east-south-east. In Grovely Hill, on the north-east of the Lickey, it passes occasionally into a hard quartzose conglomerate with a calcareous paste†, and at Finstal, on the south-west of the Lickey ridge, the upper portion of the sandstone is light-coloured, and contains obscure vegetable impressions, being a prolongation of the stratum with similar impressions, at Breakback Hill, on the west of Bromsgrove‡.

On each side of the Lickey, the sandstone is conformably overlaid by red marl, which extends on the north-east to Birmingham§, and on the south west to Stoke Prior and the neighbourhood of Hadnor where the railway intersects a ridge of lias. On the north side the marl is there cut off by a fault, but on the south, at Dunhamstead, the following juncture section is exposed:—

(a.)	Lias clay with contorted beds of lias limestone	
(b.)	White micaceous sandstone with numerous specimens of a smooth oval bivalve	2 Feet
(c.)	Lias clay	6
(d.)	Grey marl	35
(e.)	Red marl	

Dip of the beds 5° north-north-east.

In the hill south of Dunhamstead the grey marl (d) abuts against the red marl (e) in consequence of a fault. For the next five miles the railway traverses a valley of red marl, between the escarpment of the lias and a ridge of Keuper sandstone. On the south-east of Spetchley the strike of that sandstone is altered by a fault from south by east to south-west, and a projecting angle has been produced which is intersected by the railway. This stratum is a feeble representative of the Keuper sandstone of Burg Hill &c.||, consisting chiefly of greenish marl with thin laminæ of white sandstone about twenty feet thick, with red marl above and below. At Norton the railway ascends the lias escarpment, and cuts through a section exactly analogous to the one given above. A mile further south the lias clay contains many calcareous concretions abounding with fossils, including *Plagiostoma giganteum, Modiola*

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* See Mr. Murchison's Silurian System, p. 492.

† Similar conglomerates occur in Worcestershire, Staffordshire and Warwickshire.—Silur. Syst. p. 42. Geol. Trans. 2nd Series, vol. v. 347.

‡ Geol. Trans., 2nd Series, vol. v. p. 341; Proceedings, vol. ii. p. 564.

§ The red marl extends from Birmingham along the London railway as far as Berkswell, forming the basin, in which occurs the lias outlier of Knowle south-west of Berkswell. The true boundary of the sandstone and marl in this district has been only recently ascertained; it ranges from Hewell Grange, nearly north by Cofton Hacket to Northfield, and thence north east to the south suburbs of Birmingham.

|| Proceedings, vol. ii. p. 503. Geol. Trans., 2nd Series, vol. v. p. 332.

minima and a coral At Abbot's Wood the fissile sandstone at the base of the lias is again exposed, having been brought up by a fault At Defford and Eckington the lias clay encloses numerous specimens of *Pachyodon Listeri* (Stutchbury), or *Unio Listeri* of Sowerby, and *Ammonites Turneri* At Bredon a higher portion of the lias series was reached and a different suite of fossils found the most marked being *Pleurotomaria Anglica Hippopodium ponderosum Gryphæa incurva, Nautilus striatus* and several species of Ammonites Between Cheltenham and Gloucester the lias has yielded great abundance of organic remains, a considerable number of which are considered to be new and with the exception of *Hippopodium ponderosum, Gryphæa incurva,* and one or two others, they are distinct from the fossils of Bredon Hill and at Hewlitt's, east of Cheltenham, the lias near the base of the marlstone presents another series of distinct fossils The lower lias, therefore, Mr Strickland observes, affords evidences of at least four well marked successions of molluscous faunæ in a vertical height of 100 or 500 feet, and unaccompanied by any change in the mineral character of the deposits

SUPERFICIAL DETRITUS —The author then proceeds to describe the deposits of superficial detritus, and he states that they entirely confirm the views which he had previously entertained, respecting the distinction between the ancient terrestrial alluvia in which bones of mammalia occur, and the submarine drift which covers most parts of the island*

He divides the detritus into fluviatile and marine, and the latter, according to its origin into local and erratic, and this according to its composition into gravel with flints and without flints

Marine erratic gravel without flints† —Commencing his details with the Birmingham end of the line, Mr Strickland shows that these accumulations occur extensively on all sides of that town, and at intervals along the line of the railway till it approaches the valley of the Avon Mammalian remains appear to be totally wanting Chalk flints are so extremely rare in it around Birmingham as to prove that the materials were transported from the north At Mosely it is upwards of 80 feet thick and consists of rolled pebbles rarely exceeding 4 inches in diameter of various granitic and quartzose rocks and altered sandstones imbedded in a clean ferruginous sand, and a bed of sand 30 feet thick without pebbles occurs in the middle of the gravel Between Cotteridge and Wytchall is an erratic boulder, or shapeless mass of porphyritic trap about 5 feet by 4, with the angles slightly rounded At the Lickey, gravel analogous to that near Birmingham but with a large proportion of slate rocks, attains, on the line of the railway, a height of 387 feet, and at the Lickey Beacon of more than 900 feet Sugar's Brook is the next locality noticed by Mr Strickland but from that point no gravel occurs for sixteen miles Near Abbot's Wood is another extensive deposit of quartzose gravel and ferruginous sand, devoid of flints and resting upon lias

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* See Reports of the British Association, vol vi, Sessional Meetings, p 61

† Northern drift of Mr Murchison, Silur Syst, p 523

Marine erratic gravel with flints.—These accumulations commence immediately south of the Avon. The village of Bredon stands on a platform seventy feet above the ordinary level of the Avon, composed of lias with an uneven surface, and capped with 10 to 15 feet of this gravel. It contains no mammalian remains.

Fluviatile gravel.—The only example of this drift, on the line of the railway, occupies the two opposite flanks of the Avon at Defford and Eckington, north of Bredon. At these localities the surface is a tabular platform which does not exceed forty-five feet above the Avon, including a capping of ten feet of gravel precisely similar to the flinty gravel of Bredon but containing abundance of mammalian remains. They were chiefly found in the cutting north of Eckington at the lower part of the deposit and often on the surface of the lias clay, and are referrible to *Elephas primigenius*, *Hippopotamus major*, *Bos Urus*, and *Cervus giganteus*? On the north, or Defford side of the Avon the remains of *Elephas primigenius* and *Rhinoceros trichorhinus* have been obtained. Associated with these bones are numerous freshwater shells agreeing with those found at Cropthorne,* the most abundant species being *Cyclas amnica* and *C. cornea*. In endeavouring to account for the presence of these remains at only one point in the line of the railway, Mr. Strickland states that he can offer no other explanation than that previously proposed by him †, namely that after the beds of marine gravel had been deposited and laid dry by the elevation of the land, a large river or chain of lakes extended down the valley of the Avon, at a height varying from twenty to fifty feet above its present course, and that the gravel previously accumulated by marine currents, was remodified by the river, and mixed up with remains of mammalia which tenanted its banks, or of mollusca which inhabited its waters.

Local gravel.—This species of detritus occurs abundantly at Cheltenham and consists exclusively of detritus from the oolites and lias of the vicinity. No bones or terrestrial remains have been found in it, and, therefore, the author assigns to it, in the absence of other evidence, a marine origin.

Modern alluvia.—The only deposits of this nature mentioned in the paper are the peaty accumulations on the banks of the Avon and its tributaries.

The memoir was accompanied by a copy of the Railway Section, and of the Tewkesbury branch and the junction branch from the main line to the London and Birmingham Railway, presented by Capt. Moorsom but coloured geologically by Mr. Strickland.

MICROSCOPICAL SOCIETY.

Jan. 27, 1841.—Richard Owen, Esq., President, in the Chair.

A paper was read by Mr. Bowerbank, "On the Keratose or Horny Sponges of Commerce."

The author, after noticing the labours of Dr. Grant and Dr. Fleming, who have described these bodies to be animals which are 'porous with skeletons consisting of cartilaginous tubes destitute of earthy spicula' proceeds to state that he was induced to investigate this division of the Sponges in consequence of having received from Rupert Kirk, Esq , of Sydney numerous specimens of Sponges, among which were many exhibiting every appearance of being true Keratose sponges but which, upon a close examination with a high microscopic power were discovered to be abundantly furnished with siliceous spicula The existence of spicula in these specimens led the author to suspect their presence in the keratose sponges of commerce Upon examining these sponges there were found to be two well-marked species from the Mediterranean, and a third which is obtained from the West India Islands The first and commonest species of Mediterranean sponge is the *Spongia officinalis* of Lamarck When examined before it has been cleaned and bleached by the dealers with a power of five hundred linear the fibre from the exterior presents the appearance of a smooth light amber-coloured thread, but when taken from the interior it is seen to be coated with a thin and somewhat rugose film, containing minute granules, which the author believes to be the incipient gemmules of the sponge by which the sponge is propagated after the manner described by Dr Grant as occurring in other divisions of this class The greater part of the fibres consist of cylindrical transparent threads frequently anastomosing and varying considerably in their size This portion of the tissue is destitute of spicula but there frequently occur dispersed amid this form of tissue large flattened fibres running in a straight direction and it is in these that spicula are found imbedded in the centre of the tissue The spicula vary considerably in their size and form and are best obtained for examination by burning small pieces of the sponge to a white ash and washing this with dilute muriatic acid In the other sponges of commerce, spicula are found in equal abundance All the writers who have treated of *Spongia officinalis* have described it as consisting of horny tubes , but the author states this to be an error, and proves the thread in all the species of the sponges of commerce to be a solid horny fibre The second species of Mediterranean sponge is described as being very similar in its external characters, and in the size form and arrangement of its fibres, to *S officinalis* but is distinguished from it by the possession of a beautiful vascular tissue which surrounds in great abundance nearly every fibre of its structure, frequently anastomosing and running in every possible direction over its surface This tissue is not imbedded in the horny mass of the fibre, but is contained in a sheath, which closely embraces it In one of these vessels the author observed numerous minute globules, exhibiting every appearance of being globules of circulation analogous to those found in the blood of the higher classes of animals These molecules were extremely minute, the largest being but the 16,666th of an inch in diameter, and the smallest the 50,000th of an inch in diameter A similar vascular tissue is stated to exist in a considerable number of the keratose sponges of Australia The author concludes by some observations on the nature and structure of the spicula of sponges in general and endeavours to prove that they bear no relation to the raphides of vegetable bodies but are truly of animal origin, having their internal surfaces lined with an animal membrane, which becomes converted into a thin film of carbon when the spicula are exposed to the action of the blow pipe

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* Silur. Syst. p. 555, and Proceedings, vol. ii. pp. 6 and 95.

† Reports of British Association, vol. vi. Sections, p. 64.

The author illustrated his paper by numerous drawings of the tissues described, and exhibited the specimens from which they were delineated

Mr Owen exhibited the specimens of the teeth of the Labyrinthodon, described by him at the last Meeting of the Geological Society, and he explained the peculiarities of the dental structure in that extinct species of Reptiles

Mr Varley called the attention of the Society to a new form of Microscope which he had constructed with a view to facilitate the examination of minute living objects

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MISCELLANEOUS

Absorption of Liquid Solutions by the Sap-vessels of Plants —M Dumas reported to the Academy of Sciences on the 30th November 1840, that by the absorption of various fluids, Dr Boucherie had discovered a method of rendering wood more durable, of increasing its tenacity and hardness without impairing its elasticity, and of imparting to it various permanent colours and odours

Dr Boucherie found that the attractive power of the vegetable tissue was sufficient to carry from the base of the trunk to the leaves all the fluids he wished to introduce provided they were kept within certain limits of concentration He cut a tree near the base when in full sap, and plunged it into a tub containing the fluid he wished to introduce, and in a few days he found that it had risen even to the most elevated leaves and had penetrated all the tissue except the heart of the tree The same result followed whether the trunk was in an erect or inclined position It was not even necessary to divide the trunk completely, for a cavity hollowed out at its base, or a groove made with a saw over a considerable part of the circumference, was sufficient, when the cut part was brought into contact with the fluid to allow a rapid absorption to take place

Dr Boucherie ascertained that the absorption of a solution of pyrolignite of iron containing some creosote augmented the hardness of wood and prevented its decay while the penetration of the wood with solutions of the earthy chlorides and various saline matters rendered it less combustible

Various colours were given to wood by causing different substances to be absorbed in succession Pyrolignite of iron by itself gave the wood a beautiful brown colour, when it was followed by an astringent fluid containing tannin, a blue, black, or gray colour ensued, and when succeeded by ferrocyanate of potash, a deep Prussian blue resulted In the same way the absorption of acetate of lead and of chromate of potass imparted a yellow colour and by the mixture of several of these substances a still greater variety of shades was produced

Different odours were in a similar manner given to various kinds of wood

The Highland Society of Scotland have offered a gold medal or thirty sovereigns as a premium for the best account of a series of similar experiments

Congrès Scientifique de France —The Ninth Meeting of this Association, which in its plan and objects resembles the British Association for the Advancement of Science, will be held at Lyons and will occupy twelve days The Session will open on Wednesday September 1st, 1841 in the great hall of the Palais des Terreaux The Association will be particularly gratified by the attendance of men attached to science literature and the arts from the British Isles

Eels killed by the late Frost —Although it is well known to naturalists that the Eel, otherwise tenacious of life cannot bear excessive cold, I conceive that the following facts upon the subject, though by no means so satisfactory as could be wished, are worthy of being placed on record On the 6th 7th, and 8th of the present month (February 1841) great quantities of this fish in a dead state floated down the river Lagan to the quays at Belfast Here upon these days and along the course of the river within the tide way collecting dead eels was quite an occupation at low water and to the numerous loiterers about the quays proved in some cases more productive for the time than the 'chance jobs by which they gain a livelihood One individual earned his two shillings for nearly a bushel-full*, and another selling them at the same rate gained five shillings for what he collected at the fall of a tide Three examples sent me by my friend Edmund Getty, Esq , were the common Eel (*Anguilla acutirostris*, Yarr), in excellent condition and in all respects of ordinary appearance one was about a foot the others were two feet in length They were found dead of all sizes up to the largest

The only experiment I heard of being made on these Eels was that four of them of gradations in size from a foot to two feet in length were placed in water warmed to a high summer temperature, to see if they would revive, but as may be anticipated of such a proceeding none of them exhibited any signs of life A highly interesting fact connected with this fatality among the Eels is, that on the three days on which they perished from the cold, the thermometer was nearly ten degrees higher than it had been for three days successively in the preceding month when none were known to have suffered from it At that time the wind was south-west and moderate When they were killed there was a gale from the east, accompanied by hard frost to the human body the cold was at this time extreme and piercing though at the period mentioned in January it was not disagreeable At low water a great extent of mudbanks is uncovered at the part of the river where the Eels were killed and at this season these fishes are believed to be imbedded in the mud they would seem to have suffered from the intense cold arising from the rapid evaporation produced by the piercing east wind

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* The price of Eels in our market is three pence or four pence per pound

Since January 1814, such a sensation of extreme cold has not been experienced at Belfast and at that time as I am informed by Mr Hyndman great quantities of Eels met with a similar fate in the river Lagan They were seen by him floating down the stream dead, at the Long Bridge in this town It is most probably in reference to 1814 that Mr Templeton has remarked in his Catalogue of Irish Vertebrate Animals, that "great numbers of eels inhabiting the shallow watery mud on the shore of Belfast Lough were killed during a severe winter*" It is worthy of remark, that at the time just mentioned the wind was also easterly In the Meteorological Report for January 1814 published in the 'Belfast Magazine it is observed 'The continuance of the wind in the east for a longer time than usual has produced such a degree of cold as the oldest person in Ireland now alive cannot remember Notwithstanding the rise of the tide, a sheet of ice has covered the bay of Belfast strong enough to enable people to walk about with perfect safety over the channel and full half a mile from the quays Lough Neagh has also been so much frozen as to allow people on horseback to ride into Ram s Island situated two miles from the shore" I have been credibly informed that at the same period laden carts were taken over the ice to the island and that some sportsmen of the neighbourhood had a drag or trail hunt upon the lake, and followed the hounds on horseback

A lighter when coming to Belfast on the 6th or 7th of the present month, on breaking the ice at a part of the river where the banks are not uncovered to the same extent at low water as where the eels were chiefly killed, exposed a number of them which though not dead were so weak as to be unable to offer any resistance, and were lifted into the vessel On the days which proved fatal to the eels here great numbers were likewise found dead in the bay at Dundalk

The minimum thermometer at the Belfast Library indicated on the morning of

	° ″	
January 7, 1841	19 00	Wind south-west, moderate
——— 8 ———	18 50	
——— 9,	18 50	
February 6	27 75	Wind very high from the east, dry
——— 7,	27 75	
	27 50	

Wm Thompson

Donegal Square, Belfast, Feb 1841

OBITUARY —FRANCIS BAUER ESQ

Mr Bauer was born at Feldsberg, in Austria, on the 4th of October, 1758 and died at Kew on the 11th of December, 1840 He lost his father (himself an artist) at an early age, and was initiated with his brothers in the ready use of the pencil, under the guidance of an excellent mother He came to England in the year 1788 with the intention to proceed to Paris, where notwithstanding the progress of the Revolution, artists and scientific men were allowed to follow their pursuits without molestation His brother Ferdinand scarcely less skilful in the art of delineating botanical subjects, and who subsequently accompanied Mr Robert Brown as draughtsman on Flinders s voyage, had already been with Sibthorpe in Greece and was then at Oxford, busy in completing the Flora Græca Sir Joseph Banks soon appreciated Mr Bauer s rare talents as well as his singular sagacity in botanical physiology and prevailed on him to remain in England Sir Joseph in fact, settled on him 300*l* per annum for life on condition that he should reside at Kew, as botanical painter to the Royal Gardens which were then rapidly advancing to a high state of perfection The munificence of Sir Joseph enabled Mr Bauer to pursue the bent of his genius independent of the public and of booksellers and numberless beautiful illustrations of the rare plants introduced in rapid succession at Kew by the many travellers and navigators of the reign of George the Third were the result—works now deposited with Sir Joseph Banks s library at the British Museum and which all who have examined must acknowledge to be for accuracy of delineation and colouring elegance of execution as well as for physiological and anatomical truth unexampled at that period Mr Bauer was also appointed drawing-master to the Princess Elizabeth but he was a better philosopher than courtier and his services which were given gratuitously were soon dispensed with At that time he was occupied on the Heath tribe then in course of introduction chiefly from the Cape by Menzies Engravings were made from these drawings, and Queen Charlotte and the Princess used to colour them under his superintendence These were afterwards sold by public auction with other of Her Majesty s effects !

Towards the end of the last century, Mr Bauer commenced his illustrations of Orchideous plants since published by Dr Lindley He subsequently turned his attention to the diseases in corn, in which, from his skill in the use of the microscope, he made discoveries of great importance to agriculture, and therefore to mankind, and we may here state that the *only money* which he received during his long life, beyond the above-mentioned income, was fifteen guineas which the editor of one of the cheap publications of the present day sent to him for some short papers on the smut in wheat

In 1816 the late Sir Everard Home being engaged in some researches respecting the anatomical structure of the foot of the common house-fly communicated the difficulties he experienced to Sir Joseph Banks who immediately introduced him to Mr Bauer This led to an intimacy of the most lasting and most useful kind Mr Bauer solved every difficulty, and at the suggestion of Sir Everard entered on a number of other anatomical inquiries the results of which were published by Sir Everard in the Transactions of the Royal Society The most remarkable of these were his dissections and drawings of the common red earthworm the lampreys, conger-eel, Mexican Proteus metamorphosis of the tadpole, generations of oysters and muscles process of incubation from the egg to the perfect chicken, the eye structure of brain, nerves, blood, lungs urethra and muscular fibre—some of which labours have led to great improvements in the treatment of diseases and consequent alleviation of human suffering, and all display an unrivalled degree of skill, perseverance and philosophical acumen sufficient to have conferred on him the highest fame had such been his aim At the suggestion of Sir Everard Home George the Fourth resolved to establish a Botanical Museum at Kew which was to be entrusted to Mr Bauer The house now belonging to the King of Hanover was purchased for this purpose—the shelves were prepared—all the botanical books in the King's library were to be removed there and some had, in fact, been sent down when, unfortunately a dispute arose respecting the land, to which the Commission of Woods and Forests laid claim and some artillery waggons driving off with the book-cases gave Mr Bauer the first intimation that the plan had been abandoned

About this period Mr Bauer made his superb drawings of the *Rafflesia Arnoldii* (the plant of which a model in wax is preserved at the rooms of the Horticultural Society) He still continued his delineations of Kew plants and latterly more especially of the ferns published by Sir William Hooker He at the same time directed his attention to many microscopical researches—such as the structure of cotton, flax, and wool, the hairs of the various races of men, as well as of many animals the red snow of Sir John Ross, and though little known to the public, he had so well established his reputation amongst the select in every walk of science that rarely indeed would any man of science or any traveller of eminence pass through London without visiting him, and no one returned otherwise than gratified and instructed Of Mr Bauer indeed it has been truly said that nothing prevented his acquiring an extraordinary degree of fame except his remarkably unobtrusive modesty—he worked rather for the credit of others than for his own "

Mr Bauer continued, up to a late period, his microscopic researches and drawings but unwilling to risk the chance of leaving any work unfinished, he at last determined to rest, and to attempt no more Seated near his microscope, which long use had made almost essential to his happiness, he spent his hours in re-examining what his pencil had so admirably perpetuated, and reviewed in the monuments of his labour, the history of his life His was, indeed a life of incessant activity and usefulness The motives which stimulate common men never influenced him! Vanity, selfishness and illiberality were wholly foreign to his disposition, and that his innocent labours had spared him from all self-reproach and remorse his serenity his cheerful resolve to abide his time in peace, and his final departure from this world under circumstances the most consolatory full of resignation, faith and hope, and free from sufferings save the increasing debilities of old age, sufficiently prove —*Athenæum*, No 687

To the Editors of the Annals and Magazine of Natural History

GENTLEMEN

IN the Cambridge Anatomical Museum there are two skeletons of Seals which possess the characters of the *Halichœrus Gryphus* given in Bell s 'British Quadrupeds One of them was formerly in the Museum of Dr Macartney at Dublin, and was probably taken off the eastern coast of Ireland the other of large size and of advanced age if we may judge from the state of its teeth was captured in fishing nets off the Essex coast, a few years ago

I have the honour to be, gentlemen

Your obedient servant

Caius College, Cambridge, Feb 8, 1841 L E PAGET

METEOROLOGICAL OBSERVATIONS FOR JAN 1841

Chiswick —Jan 1 Hazy fine with clouds 2 Rain clear and fine hurricanes at night 3 Thunder storm about 7 A M accompanied with large and vivid flashes of lightning rain, hail and sleet, and high wind which soon after subsided into a perfect calm 4 Sharp frost slight fall of snow clear at night 5 Densely overcast snow large lunar halo in the evening 6 Hazy 7 Intense frost 8 Dense fog severe frost 9 Intense frost 10 Overcast slight haze rain at night 11 Overcast 12 Cloudy clear 13 Foggy rain fall of snow 14 Cold haze rain sleet and snow 15 Rain 16 Thawing rapidly occasioning inundations the frozen crust preventing the water from sinking into the earth 17 Continued thaw 18 Rain 19 Overcast 20 Cloudy and cold sharp frost at night 21 Frosty fine 22 Frosty rain at night 23 Clear 24 Boisterous cold and dry 25 Clear and frosty 26 Overcast and fine 27 Very fine 28 Cloudy 29 Fine 30 Hazy 31 Foggy rain

Previously to the thaw in the beginning of the month, the frost had penetrated in some soils to a depth of 12 inches

Boston —Jan 1 Cloudy 2 Fine 3 Cloudy stormy with lightning and rain early A M 4 Cloudy snow early A M stormy with rain P M 5 Stormy 6, 7 Fine 8 Fine thermometer 17° 0 three o clock P M 9 Fine thermometer 28° 0 three o clock P M 10 Cloudy large fall of snow early A M 11 Cloudy snow early A M 12 Cloudy 13 Fine rain P M 14, 15 Cloudy 16 Cloudy snow early A M rain P M 17 Fine 18 Cloudy 19 Cloudy rain early A M 20 Snow snow P M 21 Cloudy snow early A M 22, 23 Fine 24 Stormy heavy snow storm P M 25 26 Fine 27 Fine beautiful morning 28 Cloudy 29 Fine 30 Cloudy 31 Rain rain early A M snow storm P M N B The 8th of this month was the coldest day since Jan 1, 1820

Applegarth Manse, Dumfries shire —Jan 1 Slight showers 2 Slight showers frost in the morning 3 Snow-storm 4 Snow storm and frost. 5 Snow storm 6 Fair snow lying 7 Snow fall frost very keen 8 Snow fall slightly frost keen 9 Thaw, with slight snow 10 Snow and frost again 11 Fair snow lying thaw P M 12 Fair but freezing hard 13 Fair freezing 14, 15 Fair 16 Storm of snow sleet and rain 17 Thaw heavy rain P M 18 Frost again clear 19 Frost again 20 Frost again Aurora borealis 21 Thaw drizzling rain 22 Wet and boisterous 23 Wet and boisterous slight snow-fall 24 Fair frosty slight snow fall 25 Frost A M drizzle P M 26 Thaw and thick fog 27 Shower in afternoon 28 Fair and fine snow melting 29 Drizzling 30 Thick fog all day 31 Clear and cold moist P M

Sun shone out 25 days Rain fell 10 days Snow 8 days Frost 16 days Fog 2

Wind north 2 days North-east 5½ days East 2 days East-south-east 3½ days South-east 1½ day South west 4 days West-south-west 1 day West 4 days West-north-west 2½ days North west 3 days North-north-west 2 days

Calm 8 days Moderate 8 days Brisk 3 days Strong breeze 7 days Boisterous 4 days Stormy 1 day

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr Roberton, *by* Mr Thompson *at the Garden of the Horticultural Society at Chiswick, near London, by* Mr Veall *at Boston, and by* Mr Dunbar *at Applegarth Manse, Dumfries-shire,*

Days of Month 1841 Jan	Barometer						Thermometer								Wind				Rain				Dew point
	London Roy Soc. 9 a.m.	Chiswick		Boston 8½ a m	Dumfries-shire		London Roy Soc			Chiswick.		Boston 8½ a.m	Dumfries shire		London Roy Soc 9 a m	Chiswick 1 p m	Bost	Dum fries shire	London Roy Soc 9 a m	Chiswick	Boston	Dumfries shire	Lond Roy Soc 9 a m
		Max	Min		9 a m	8½ p m	Fahr 9 a.m	Self register Max	Self register Min	Max	Min		Max	Min									
1	29 962	29 942	29 882	29 50	29 72	29 76	40 3	44 2	37 5	45	34	39	47	38	W	W	calm	W	016				34
2	30 096	30 086	29 816	29 70	29 95	29 61	39 7	45 5	40 0	45	32	35	43	33	W	W	calm	W		15			35
3	29 304	29 302	29 084	28 86	29 01	28 74	35 8	44 8	36 0	39	21	37	44	30	S	NW	W	WNW	166		13		35
4	29 002	29 185	28 978	28 75	29 20	29 46	30 4	38 7	29 8	35	29	28 5	35	29	S	NW	calm	NE	061				32
5	29 308	29 376	29 316	29 10	29 53	29 60	31 8	36 3	30 0	33	22	33	35	27½	NW	N	NW	NE	036		47		29
6	29 528	22 631	29 518	29 28	29 55	29 61	27 7	34 4	28 3	30	12	27	29	19	N	SE	calm	E					27
○ 7	29 696	29 760	29 698	29 45	29 58	29 58	19 7	29 8	20 7	27	6	13 5	19	1	NW	NE	calm	NE				0 00	21
8	29 884	29 893	29 866	29 70	29 60	29 67	19 7	27 3	19 5	20	6	9 5	30½	8½	SSW	NW	calm	SE					24
9	29 706	29 738	29 441	29 47	29 37	29 07	21 2	21 4	14 9	33	27	15 5	34	18	SW	S	calm	ESE					18
10	29 230	29 247	29 089	29 04	29·00	28 94	32 4	32 8	22 2	39	31	27	33½	27	SE	SE.	calm	ESE		40			25
11	28 864	29 064	28 864	28 66	28 90	29 05	34 3	37 7	32 8	39	33	32 5	35½	23½	S	SW	calm	ESE	205	02			28
12	29 366	29 578	29 364	29·02	29 19	29 38	35 2	37 2	33 0	39	22	34	34½	28	W	SW	calm	NE					30
13	29 550	29 563	29 324	29 27	29 38	29 38	35 2	38 0	32 8	38	32	27	33½	10	S	E.	calm	NW		29			32
☾ 14	29 370	29 398	29 176	29 16	29 40	29 46	35 2	39 2	34 0	36	32	35	29½	14	NE	NE	calm	NNW	352	80	11	0 00	32
15	29 578	29 687	29 559	29 29	29 55	29 57	34 8	37 2	33 3	39	31	36	31	15½	NW	SE	calm	NE	700	15			33
16	29 654	29 631	29 365	29 39	29 40	28 93	37 4	38 2	33 6	52	40	33 5	37½	30	E	SW	calm	E	088	16			35
17	29 632	29 729	29 605	29 20	29 18	29 34	47 4	51 8	37 0	52	45	42	40½	35½	SE	SW	calm	WSW	166	02	38		41
18	29 736	29 725	29 685	29 29	29 52	29 70	46 8	52 3	46 7	47	33	43 5	35	31½	S	W	calm	N		24			42
19	29 812	29 918	29 778	29 45	29 80	29 91	35 5	48 7	35 0	36	28	35	34	24	NNW	N	calm	NNW	227	02	05		37
20	30 050	30 182	30 019	29 73	30 03	30 14	34 3	37 8	32 6	34	22	30	32½	23	NW	N	N	N	022				32
21	30 410	30 505	30 374	30 00	30 19	30 20	29 8	34 7	28 4	38	25	29	39	23½	W	NW	calm	NW					29
● 22	30 396	30 303	30 157	29 96	29 97	29 70	34 5	39 4	30 2	44	32	36	42	35½	S	SW	calm	SW		10		2 35	34
23	30 084	30 108	30 001	29 65	29 85	29 75	39 3	44 7	34 3	43	32	36	38	31	NW	NW	N	WNW	100				37
24	29 796	30 161	29 796	29 41	29 77	30 13	36 7	42 0	36 0	38	26	34	34	26½	NW	N	N	NW		02			33
25	30 350	30 336	30 195	30 00	30 10	29 88	31 5	38 0	31 0	40	32	28 5	35	21½	SW	W	calm	SW	033	01	15		31
26	30 000	30 000	29 988	29 59	29 70	29 70	42 7	43 6	31 0	49	43	38	42	36	WSW	SW	calm	SW					35
27	30 050	30 225	30·015	29 58	29 77	29 97	47 3	48 6	43 0	53	34	47	48	38	SSW	W	calm	W					40
28	30 322	30 300	30 250	29 83	30 12	30 14	37 8	52 8	36 0	44	28	41	45½	37	SW	W	calm	WNW					36
29	30 202	30 208	30 176	29 80	30 10	30 11	37 7	44 8	36 0	46	32	36 5	42½	41	NW	N	calm	W		02		0 55	37
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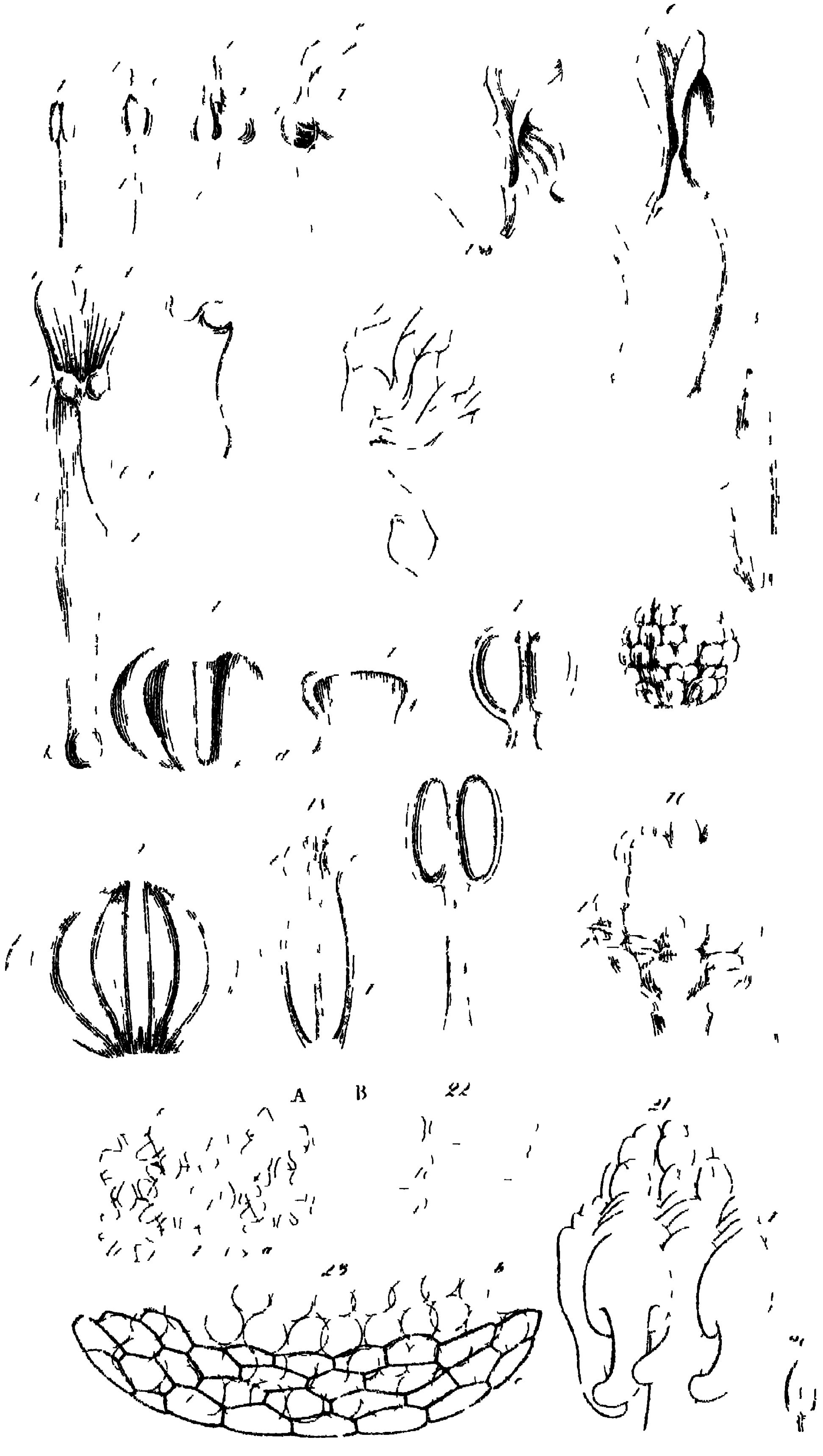
Mean	29 788	29 813	29 701	29 44	29 635	29 647	35 3	40 3	32 7	39 90	28 61	32 7	37 0	26 7					Sum 2 224	2 60	1 55	0·92	Mean 33



Aquilegia vulgaris

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

No 42 APRIL 1841

X —*Contributions to British Actinology* By Edward Forbes, M W S , For Sec B S , &c

I *On* Kapnea, *a new Helianthoid Polype**

In August 1840, I dredged on the east coast of the Isle of Man, about a mile from Douglas Head, a very remarkable and beautiful Zoophyte, of the family *Actiniadæ* It came from a depth of 18 fathoms, and the sea-bottom at the place where it was taken is chiefly *Millepora* To a fragment of that coral it was adhering by its expanded base, and when taken its tentacula were retracted The body presented the appearance of a lengthened cylinder arising from a broad-spreading inflated base, and terminating in a round tentaculiferous disc, in the centre of which is a circular mouth The tentacula are very short, and have the aspect of squared tubercles They are arranged in three circles, sixteen in each circle, those of the outermost or marginal row largest Below the tentacula and surrounding the disc is a granulated calycine circle or belt, and a little below it, extending downwards over a portion of the base, the body is invested by a woolly, brown epidermis, which is eight-cleft or lobed at its upper part The base is somewhat lobed, and usually swelled out with sea-water The body and base are of a vivid vermilion colour, the latter with darker longitudinal stripes The tentacula are somewhat paler and inclined to orange They can be drawn within the body, the upper part of which can be retracted as low as the commencement of the epidermis When fully expanded, this animal was an inch in height by one-fourth of an inch broad at the disc It is rather an active creature, changing its form often, but always presenting more or less of a tubular shape, like a chimney-crock or steamboat funnel

The shape of the tentacula and the presence of a regular epidermis are the most remarkable features of this *Actinea*, and distinguish it at once from all its tribe. Its general form and calycine rim approach to the *Actinea bellis* and some other species appertaining to the genus *Actinocereus* of Blainville. The epidermis and the imperforate tentacula separate it from Ehrenberg's restricted genus *Actinea*, and the absence of dermal pores from his *Cribrina*, neither of which divisions, as defined by that naturalist, I am inclined to admit, and therein agree with my friend Dr Johnston. It is more nearly related to the *Zoanthida* than any known species of its family, and presents a most interesting transition from the typical *Actiniada* to that tribe. The regular form of the singular epidermis would lead us to consider that appendage as an imperfect tube, and some curious analogies might result from such a view. Both the number of the tentacula and of the clefts or lobes of the epidermis being multiples of four, is important, as supporting the notion that four is the typical or dominant number of the *Actiniadæ*, perhaps of all Zoophytes.

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* Communicated to the Wernerian Society, January 23, 1841

On account of the above characters, I have thought it right to constitute a separate genus for its reception under the name of *Capnea* (from καπνη, a chimney), and define it thus:

Body cylindric, invested in part by a lobed epidermis, and adhering by a broad base. *Tentacula* simple, very short, retractile, surrounding the mouth in concentric series.

Sp. *Capnea sanguinea*, Forbes.

Tentacula arranged in three series, sixteen in each. Body and disc scarlet. Epidermis brown.

Hab. Deep water, Irish Sea, among *Millepora*. Pl. I. fig. 1, *a*, *b*, *c*, *d*.

II. *A British* Hippocrene.

The genus *Hippocrene* was constituted by Brandt for a very curious and beautiful little Medusa observed by Martens in Behring's Straits, and which had been previously described by Lesson, who had it from the Malanine Isles, under the name of *Cyanæa Bugainvillii*. Lesson afterwards re-named it *Bugainvillia macloviana*, but Brandt's generic name takes precedence by right of priority. The generic character depends on the production of the mouth into a sort of trunk, which has wing-like appendages at its sides, and terminates in four branching tentacular arms. From each of the appendages runs a canal to the margin, where we find the tentacula collected in fasciculi, and not surrounding the edge, or separate, as in most allied Medusæ.

When naturalizing on the north coast of Ireland with Mr Smith, of Jordan Hill, in 1839, I took a number of Medusæ of this genus by the towing-net, in Ballycastle Bay and at Port Rush, and afterwards, during the same summer found it on the other side of Britain, at the mouth of the Frith of Forth. My animal is larger, and differs in several particulars from that described by Brandt and by Lesson, and I regard it as a new species. In form it is almost globular, and it measures an inch in length. The central cavity is oblongo-quadrate, and occupies about one-half of the globular umbrella. At its summit interiorly are seen four stomachal appendages, placed at right angles to each other so as to form a cross. They are equal in size, of a yellow colour, squared above, rounded below, and oblong. At their lower or oral extremity are seen four slender white arms, which dichotomously divide into numerous tentacula with globular tips. These arms are very extensile, but are never sent from out the cavity. From each of the four oral appendages or *alæ* runs a translucent canal to one of the four fascicles of the tentacula, one of which is seen at each angle of the quadrate cavitary opening. These tentacula are very curious. They are highly contractile, and spring from little arches of a glandular appearance and a red colour, which form the bases of the fascicles, and into which the four canals run. On magnifying one of these arches, we find it to consist of two parts, one (the upper) red, the lower white, and each of these to consist of a great number of tubercles, which form the roots of the tentacula. On each tubercle is a minute black ocular dot. The tentacula are not all extended at the same time, very often one, two or three only are sent out, but there appear to be more than a dozen pairs of tubercles in each arch. Between the arches the margins of the cavity are straight, and furnished with a semicircular lip or valve. The outer surface of the body is smooth, and the appearance of the creature is that of a crystal bubble, with four red dots round a square opening, and a central yellow nucleus, having branched threads suspended from it.

Sars, in his 'Beskrivelser,' &c. has figured and described a minute Medusa under the name of "*Cytæis ? octopunctata*," which evidently belongs to the same group with the above. The known species of *Hippocrene* may be summed up as follows:—

H. Bugainvillii, Brandt. (See figure in Petersburgh Transactions for 1838.) Stomachal appendages as long as the proboscis, eight, the four larger ones oblong, yellow, with red centres. Tentaculiferous glands four, red and yellow, with pink tentacula. Umbrella in part pilose. North Pacific.

H brittanica, Forbes Stomachal appendages as long as the proboscis, four, equal, yellow Tentaculiferous glands four, red and white, with white tentacula Umbrella smooth North of Ireland and East of Scotland

H octopunctata, Sars (Beskr og Jagt p 28 t 6 f 14) Stomachal appendages shorter than proboscis, four, unequal Tentaculiferous glands eight, black Umbrella smooth Coast of Norway

Plate I fig 2 *a*, *Hippocrene brittanica*, of the natural size, 2 *b*, its stomachal appendages and oral arms, 2 *c*, a tentaculiferous gland and tentacula

III *New Species of* Thaumantias

The Medusæ of this very natural genus, established by Eschscholtz, have a simple stomachal cavity, from which proceed four simple canals, no arms, but a probosciform mouth, which cannot be prolonged beyond the general cavity, and a margin surrounded by tentacula, which are usually bulbous at their bases, and are highly extensile The species of *Thaumantias* are small animals, and probably numerous in the northern seas Hitherto they appear to have been mostly confounded under the *Medusa hæmisphærica* of Muller, which is a prettily coloured species, already recorded as a native of the British seas I have never met with an example which I could refer to Muller's animal, but have found four very well marked species which have hitherto been unrecorded

1 *Thaumantias pileata*, nov sp Umbrella cap shaped Oral peduncle and clubs of the vessels pink Proboscis four-cleft at the mouth, lobes acute Eyes large, black and yellow, on the bulbous origins of the twenty tentacula

This pretty species, the shape of which resembles that of a Chinese hat, measured about an inch across The clubs of its vessels are small and narrow It was taken at Port Rush, on the north coast of Ireland, in June 1839

Pl I fig 3 *a* & *b*, *Thaumantias pileata*, 3 *c*, its oral peduncle

2 *Thaumantias Thompsoni*, nov sp Umbrella hemispherical, very convex Proboscis four-cleft, lobes triangular Clubs of the vessels, proboscis and bases of tentacula yellow Eyes minute, black, on the triangular bases of the sixteen tentacula

Pl I fig 4 *a* & *b*, *Thaumantias Thompsoni*, 4 *c*, one of the tentacula

Taken abundantly in Clifden Bay, Cunnemara, by Mr Thompson, Mr Ball, and myself, in July 1840 A small species, one-fourth of an inch across, clubs of the vessels short and broad

3 *Thaumantias punctata*, nov sp Umbrella hemispherical Clubs and proboscis pink Proboscis four-cleft, lobes sub-acute Eyes large, black on the bulbous bases of the thirty-two tentacula

Pl I fig 5 *a b*, *Thaumantias punctata*, 5 *c* one of its tentacula

This species, measuring near an inch across, was taken plentifully in July 1839, in the Frith of Forth, near the Isle of May

4 *Thaumantias sarnica*, nov sp Umbrella hemispherical Clubs and proboscis bluish Proboscis four-cleft, lobes acute Eyes ? Tentacula twenty

Measured half an inch across Taken in the Channel, between Guernsey and Herm, August 1839

Pl I fig 6 *a b*, *T sarnica*, 6 *c*, its proboscis

These additional species double the number of members of this genus The four previously recorded were, 1 *T cymballoidea* (*Medusa cymballaroides*, Slabber, *Dianæa*, Lamarck, see fig in Encyc Meth pl 93 fig 2—4) 2 *T hemisphærica* (see fig in Zool Dan t 7), recorded as English by Dr Macartney, as Irish by Mr Thompson 3 *T multicirrhata* (Sars, Jagt og Beskr p 26 t 5 fig 12) 4 *T plana* (Sars, p 28 t 5 f 13), both natives of the Norwegian seas, and to be looked for in our own The former of Sars's species is easily recognised by its numerous tentacula, above 200, and the elongated clubs of the cross-vessels, the latter by its being quite flat, and also having numerous tentacula

In observing species of *Thaumantias*, of which many more may occur in our and in other seas, the points especially to be noted are, 1st, the number of tentacula (always a multiple of four), 2nd, the presence, absence, size and colour of eyes at their bases, 3rd, the colour of the cross vessels and proboscis, 4th, the shape of the umbrella, 5th, the shape of the clubs of the vessels, and 6th, the form and lobation of the oral proboscis or peduncle I have mentioned these sources of character in what I conceive to be the order of their respective importance, but all should if possible be noted

XI — *Description of some new Species and four new Genera of Reptiles from Western Australia, discovered by* John Gould, Esq By J E GRAY, Esq, F R S, &c

To the Editors of the Annals and Magazine of Natural History

GENTLEMEN,

MR GOULD having kindly placed in my hands the collection of Reptiles which he made during his visit to New Holland to gather materials for his 'History of the Birds of Australia,' I have sent you the description of the following species, which appear to be new to science The two new genera are very interesting, the one, *Roma*, being exactly intermediate in organization between the two-legged and the four-legged Scincs, and the other, *Moloch*, for its extraordinary appearance and grotesque forms

I may remark, this collection contains two specimens of *Soridia lineata*, Gray, which MM Dumeril and Bibron have accused me of erroneously describing as an Australian animal (See 'Erpétologie Générale,' v 787) I believe that this has arisen from M Bibron supposing all the Reptiles that he saw at the Chatham Museum to be from the Cape of Good Hope, whereas that collection is very rich in Australasian Reptiles *Chelomeles* of MM Dumeril and Bibron appears to be very nearly allied to *Soridia*, and should most probably be arranged with it in the family of *Rhodonida*

Mr Gould's specimens of *Delma* having enabled me to examine more minutely the characters of that genus, I am now convinced that it should be referred to the family *Pygopidæ* It chiefly differs from the genus *Pygopus* in the small size of the rudimentary feet and in the absence of the pre-anal glands

The genus *Lialis*, which heretofore has been placed with *Pygopus*, appears to be the type of a new family It, *Delma* and *Pygopus* are all found in Western Australia, as is also the genus *Aprasia*, which ought, in my Catalogue of Slender-tongued Saurians (Ann Nat Hist vol i and ii), to have been arranged with the Apodal Scincs On examining Mr Gould's better-preserved specimen, I am inclined to consider it also as the type of a family characterized by the shields of the head and the position of the nostrils, to which, most probably, MM Dumeril and Bibron's genus *Brachymeles* will also have to be referred These genera will then range thus —

Fam LIALISIDÆ —*Lialis*

Fam PYGOPIDÆ —*Pygopus Delma*

Fam RHODONIDÆ —*Rhodona Soridia Chelomeles*

Fam APRASIADÆ —*Aprasia, Brachymeles*

RONIA Gray Fam Scincidæ

Head rather shelving shielded with one transverse frontal and two large vertebral plates the hinder largest the rostral plates large, with two unequal superciliary plates The nasal plate triangular interposed between the rostral plate and the frontal ones, with the nostrils in its centre loreal plates two square, labial plates large ears none, only a very indistinct sunk dot in their place Body cylindrical tail conical tapering Scales smooth ovate imbricate of the belly 6 sided The front limbs very small rudimentary undivided the hinder limbs moderately developed ending in two very unequal toes with distinct claws

Ronia catenulata Gray Back with eight series of small black dots one dot on the centre of each scale cheeks black, speckled sides and beneath whitish

Body 3½ tail 2½ inches

Inhab Western Australia Mr J Gould

The scales under the tail are rather larger, and the spots on the tail are rather larger than those on the back

Grammatophora cristata Nape with a crest of distinct rather short curved compressed spinose scales back and tail with a series of compressed scales forming a slight keel occiput with separate short strong conical spines sides of the neck and back with folds crowned with series of short compressed scales base of the tail with some scattered larger scales In spirits dull olive crown black with large white spots beneath black middle of the belly and under sides of the base of the tail white tail with black rings at the ends, feet whitish

Inhab Western Australia Mr J Gould

The underside is coloured somewhat like *G maculatus* (*G Gaimardii* Dum and Bibron) but the sides of the head near the ears are spinose and the nape is distinctly crested But as MM Duméril and Bibron's species is only described from a single specimen which is in a bad state and has lost its epidermis and as the description itself though long refers chiefly to parts which do not differ in the species of the genus this species may prove to be identical with it

These authors, in giving the character of *Grammatophora Gaimardii* and *G Decresii* appear to place great reliance on the one having tubular and the other non tubular femoral pores which is in fact entirely dependent on the state in which the animal might be at the time when it was put into the spirits, as I have verified by comparing numerous specimens of different reptiles furnished with these pores

But in this genus the size of the pores is apparently of less importance than in many others, for they appear to be quite invisible in some states of the animal thus out of many specimens of *G muricata* brought by Mr Gould from Van Diemen's Land and Western Australia eight specimens have no visible pores these specimens differ from the others in being of a rather paler colour beneath This state of the pores may entirely depend on the manner in which they were preserved for all these specimens had a slit made into their abdomen to admit the spirits, while in all specimens in which this care had not been taken the pores are distinctly seen sometimes moderately sized and sometimes tubularly produced

Grammatophora Decresii Dumeril and Bibron Erp Gen iv 472 ?
Tail conical with nearly regular scales, the base rather swollen without any series of spines on the side back with small subequal scales and a few larger ones in cross series the nape and back with a series of rather larger low compressed scales, side of the head near the ears and side of neck with two or three ridges crowned with short conical spines In spirits black, yellow spotted and varied beneath gray vermiculated with blackish tail black ringed
Inhab Western Australia

This species is so much smaller than *G muricata* that I might have considered them as young animals if one of them had not had the body filled with well formed eggs and the tail is much shorter than in the young of that species

The specimens agree in most points with the description given by MM Dumeril and Bibron but not in the colour and the size of the tail The specimens in this collection greatly differ in their colour but are all very different from any other species

Grammatophora muricata Cuvier The young animals have a series of small spines on each side of the base of the tail and a series of spots on each side of the back
Mr Gould has brought home two very distinct local varieties

Var 1 *Diemensis* *Young* dark coloured with vermiculated marks on the chin chest and abdomen The *adult* dark beneath gray varied with black spots placed in irregular lines
Inhab Van Diemen s Land

Var 2 *Adelaidensis* *Young* pale above and beneath, with three broad diverging black lines on the chin leaving an oblong spot in the centre of the throat with a broad streak on the chest separated into three lines on the abdomen which unite together again on the pubis The *adult* gray with a few spots beneath
Inhab Adelaide, Western Australia

MOLOCH Gray Fam Agamidæ

Body depressed covered with irregular unequal, small, granular plates, each furnished with a more or less prominent central spine, and with a series of large conical convex acute spines, head and limbs covered with similar scales and spines head small with very large spines over each of the eyebrows tail with irregular rings of large acute spines, femoral and subanal pores none, teeth small, subequal, toes 5 5, short, covered above and below with keeled scales claws long, acute

The external appearance of this Lizard is the most ferocious of any that I know the horn of the head and the numerous spines on the body giving it a most formidable aspect The scales of the back are small and unequal they gradually increase in size as they approach the base of the conical spines which is surrounded with a ring of larger scales with longer spines the large spines are conical, rather compressed spinulose below smooth and acute at the tip and are usually furnished with a sharp toothed ridge on the front edge and sometimes on the hinder one These spines only consist of a horny sheath placed on a fleshy process of the very same form and appearance as the spines they bear The scales of the under side of the body are of the same form and are furnished with similar but smaller and less produced spines than those of the back The back of the neck of the only two specimens I have seen is furnished with a large rounded protuberance like a cherry covered with large granular spinous scales and armed on each side with a large conical spine but I do not know if this is common to the species or merely accidental in these individuals at any rate it adds considerably to the singularity of their appearance

I have named this genus, from its appearance after '*Moloch*, horrid king

Moloch horridus Pale yellow marked with dark brown regular spots sides and beneath black edged dark red similar spots

Inhab Western Australia Captain George Grey Mr J Gould

The marks on the body are very definite but from the irregularity of their form they are not easily described The lips are dark brown, with two streaks up to the small spines on the forehead, there is a dark cross band from the base of the two large horns over the eyebrows running behind and then dividing into two broad streaks one along each side of the centre of the back of the neck to between the shoulders crossing the nuchal swelling In the middle of the back there is a very large black patch nearly extending from side to side and over the loins are two oblong longitudinal black spots the dark lines commencing from the lower angle of each eye extend to the legs along the upper part of each side to the upper part of the groin On the front of the fore- and hind legs and the sides are marked similar dark bands A dark band commences from the hinder part of the lower lip merging in the throat and expanding out so as to be united together at the back part of the chin There is a large, rather oblong spot in the centre of the chest and the hinder part of the abdomen, separated from each by a large somewhat triangular spot on each side of the middle of the abdomen, body 4½ inches

This is the Spinous Lizard exhibited by Mr Gould at the meeting of the Zoological Society on the 25th day of August 1840

Breviceps Gouldii Smooth with a few scattered low tubercles, gray brown yellowish beneath

Inhab Western Australia

This animal has all the external appearance and character, as far as they are given in MM Dumeril and Bibron s work, of the *Breviceps gibbosus* of the Cape of Good Hope, except that it has not the yellow dorsal band and the back is scarcely to be designated as granular It is the second species of the genus and only the second Toad found in Australia the other being *Phryniscus australis* which I described in the Proceedings of the Zoological Society under the name of *Bombinator australis*

UPEROLIA Gray Fam Ranidæ

Head large palate quite toothless upper jaw with small close teeth the tympanum hid under the skin the toes of the fore- and hind feet elongate slender quite free the ankle with a roundish external and a small conical inner tubercle the tongue small oblong roundish and entire behind

This genus is most nearly allied to *Leiuperus* of MM Dumeril and Bibron, with which it agrees in having no teeth on the palate, but it differs from it in the tympanum being quite hid

The internal nostrils are some distance in front of the cross ridge on which the palatine teeth are generally placed

Uperolia marmorata Black and green marbled leaving a triangular greenish spot on the forehead, beneath lead colour

Inhab Western Australia

Dr Tschudi has formed a genus under the name of *Crinia* which appears by his characters to be nearly related to the above, but MM Dumeril and Bibron (Erp Gen viii 416) observed that the specimens he described have two very small groups of teeth on the vomer

Hyla bioculata, Gray Slender, fore-toes quite free, hinder toes webbed to the last joint (in spirits) Grayish white, with a series of very small indistinct oblong tubercles with a dark streak from the nostrils to the shoulder enclosing the eyes and a white streak below it from the under side of the eye sides purplish, with small white spots, back of the thighs purple, with two yellow spots, belly and under side of thighs whitish granular

Var 1 Back of thighs with one or two additional yellow spots

Var 2 Back bluish gray, back of the thighs with six or seven small subequal yellow spots

Inhab Western Australia

Hyla Adelaidensis, Gray Slender, fore toes quite free hinder toes webbed to the last joint, (in spirits) gray blue with a series of small oblong tubercles, the sides purple-brown, with a white streak from the under side of the eyes to the shoulders, sides of the belly and region of the vent purplish, with small white spots, the hinder side of the thighs purple brown, with three large oblong white spots, belly and under side of thighs granular, chin white, brownish dotted, palatine teeth in two roundish groups between the internal nostrils

Inhab Western Australia

HELEIOPORUS Gray Fam Ranidæ

Head short swollen eyes large convex, palatine teeth in a straight interrupted ridge between the two internal nostrils teeth very small, body swollen skin of the back minutely granular of the belly smooth legs rather short toes 4 5 short warty beneath quite free the hind wrist with a large, oblong compressed internal tubercle, the base of the inner finger with a conical wart ending in a small acute bony process tongue large entire behind

This genus has many of the characters of *Cystignathus* but differs from it in being warty and swollen and in having short toes like a Toad

Heleioporus albo punctatus Lead coloured (in spirits), with white spots beneath dirty white with some small white warts at the angle of the mouth , legs smooth

Inhab Western Australia

Cystignathus dorsalis The palatine teeth in a single large straight line just behind the inner nostrils, tongue large slightly nicked behind the tympanum nearly hid under the skin, gray brown (in spirits) marbled with dark irregular spots, with a white streak down the middle of the forehead and front of the back sides pure white spotted and marbled with black beneath white, toes elongate slender, tapering back part of thighs brown white speckled

Inhab Western Australia J Gould

This species is very distinct from *C Peronii* and *C Georgianus* the two Australian species described by MM Dumeril and Bibron It agrees with the former in the disposition of the palatine teeth

Elaps Gouldii Gray Pale yellowish the scales of the back small six sided, with a dark anterior margin, giving the back a netted appearance, top of the head and nape black with a yellow spot on the rostral scale on each side just before the eyes, head small the occipital plates large elongate the nasal plate triangular one moderate anterior and two subequal posterior ocular shields, six upper and lower labial shields, the fourth under the eyes, eyes small, pupil round

There is an indistinct small yellow spot behind the upper part of the eye but this may be an accidental variety as the spots on the two sides are not equally defined

Inhab Western Australia

This species resembles *Calamaria Diadema,* which is also found in Western Australia but it is larger and the head is larger in comparison with the body and in this species it is the base of the scales, while in the latter it is the outer margin that is dark

XII —*Description of some new species of Madeiran Fishes, with additional information relating to those already described* By the Rev R T LOWE, M A *

[Continued from vol iv p 424]

Family TRIGLIDÆ

SCORPÆNA USTULATA S *minor, laciniis nullis, rubra pallido variegata nigroque punctata, genis operculisque granulato pustulosis macula fusca notatis pinnæ dorsalis medio unimaculatæ spina quarta ceteris longiore capite s rostro abbreviato obtuso, maxillis æqualibus squamis majusculis scabriusculis*

D 12+9, A 3+5 P 1+VII+10 V 1+5 C $\frac{5+\text{VI}}{5+\text{V}}$

Rariss

Occasionally taken with the common sort (*Sc scrofa* L) with which it agrees in general colouring resembling rather the Rocaz (*Sebastus maderensis* nob) in shape It appears undescribed and is very distinct in its characters, being a true *Scorpæna* notwithstanding the absence of *laciniæ* having the whole head naked or scaleless It scarcely attains half the size of *Sc scrofa* L

Fam SCOMBRIDÆ

*Naucleru*s *abbreviatus* Cuv et Val Hist IX 251

Two individuals have occurred of this pretty little fish answering so well to the species above referred to that it were unreasonable to doubt their identity although its describers have omitted mentioning a strong superscapulary spine, and a fourth smaller tooth or spinule along the lower border of the preopercle anterior to the three which arm its angle Alive, and in a glass of sea-water the activity and lovely colours of these little fishes rendered them most interesting objects They were taken following a piece of floating timber, and until close examination after death, could scarcely be distinguished from the young of *Naucrates ductor* Cuv but for the absence of the caudal keels

TETRAPTURUS GEORGII — *Peito*

Having at length, through Mr Leacock's kind exertions, obtained a fine example of the *Peito* in perfect condition, I am enabled to state that it forms a new and very distinct species of *Tetrapturus* Rafin , differing from *T belone* Raf as described by MM Cuvier and Valenciennes, especially in having the pectoral fins proportionally twice as long and the body clothed with large scales of a peculiar shape and nature I only forbear to draw up its specific character till I have checked my notes and observations by examination of more examples, but I hope to be allowed the privilege at once of commemorating by its specific name the valuable assistance rendered to the cause of Ichthyology by Mr George Butler Leacock, of this island generally as well as in the present instance

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* Read before the Zoological Society, June 9, 1840

Fam CORYPHÆNIDÆ

Asteroderma coryphænoides (Bon) *Astrodermus coryphænoides* Cuv et Val IX 353 *t* 270 —*Diana semilunata*, Risso Hist iii 267 *f* 14

A single small example only has occurred

Fam LABRIDÆ

Ctenolabrus iris Cuv et Val XIII 236 Rariss

A most elegant and well-marked little species

JULIS UNIMACULATA — '*Peixe verde* —*J elliptico oblonga, gracilluscula corpore aurato viridi lateribus medio fascia longitudinali obscura squamis magnis, litura rufa perpendiculate notatis capite rosaceo rufo strigis fasciisve flexuosis cæruleis picto pinna dorsali medio unimaculata analique basi squamatis operculo postice biangulato cauda lunata lobis abbreviatis*

D 8+13 A 3+11 P 2+13 V 1+5 C $\frac{2v}{2v}\,\frac{3+\mathrm{VI}}{3+\mathrm{VI}}$

Var *α tæniata* corpore 5–6-fasciato fasciis angustis viridibus immaculatis Vulgatiss

Var *β lineolata* corpore efasciato, toto lituris rufis creberrimis ad perpendiculum ductis æqualiter picto Vulg

Blended apparently by Valenciennes (Hist XIII 377) with the blue collared *J turcica*, Risso, under the name of *J pavo* as formerly by me considered merely a variety of *J turcica* Long continued observations have however, established its claim to rank as a species which is composed of two varieties precisely corresponding with the two of which the true *J turcica* consists

Fam GADIDÆ

MERLUCIUS AMBIGUUS — *Morcego do mar*

Having only obtained a single individual I forbear attempting a specific character of this little Hake which in the production into a filament of the second ray of the ventral fins and grooved nape, resembles a *Motella* wanting on the other hand the beards and having no trace of any fin within the nuchal groove From *Merlucius Maraldi*, Risso Hist iii 220 it differs in the colouring , and though the upper jaw closes over the under it scarcely can be called ' longer In Risso's fish the nape is grooved (*sillonnee*) but he says nothing of any peculiarity about the ventral fins

The Madeiran Hake, or Pescada ' *Merlucius vulgaris* of my Synopsis, p 189 proves, upon better acquaintance, distinct from the common British Hake *M vulgaris* Cuv Yarr &c (*Gadus Merluccius* L) Instead of being even the dorsal and anal fins are each produced at their hinder end into a rounded lobe the jaws are nearly equal in length , the teeth are large and numerous , the scales small I do not name it for I believe it has already been called by Mr Swainson *M sinuatus* , and I am doubtful whether it may not also be the *M esculentus* of Risso iii 220 though in his synonyms he has confounded it with the true Northern Hake I believe it to be the fish imperfectly figured long ago by Salviana, p 73 copied by Willoughby *t* L membr 2 *n* 1, which has usually been referred to also for the Northern Hake

Fam Exocidæ

Cypselurus pulchellus

From want of materials for comparison I am unable to give correctly the specific characters of this most elegant little Flying-fish which is remarkably characterized by two or three bright rose coloured horse-shoe shaped marks on each side of the belly, one behind the other The ventral fins are placed a little behind the middle of the body, not reckoning the caudal fin and their tips reach to the base of the latter The tips of the pectoral fins reach only to the end of the base of the dorsal fin which is large high and produced The anal fin is small and low but a little produced backwards The cirrate appendage to the lower jaw is like a leathern flap or apron torn irregularly at the bottom into strips or thongs I willingly abandon my own MS name of *Cheilopogon* for this genus distinguished from *Exocœtus* by the variously appendaged lower jaw in favour of the designation which I find this group of fishes has received from Mr Swainson whilst this paper has been going through the press

Fam Diodontidæ

Diodon Hystrix α Linn —*D punctatus* Cuv —*Hystrix piscis Clusii* &c Will *t* I 5

A single example only has occurred

Fam Squalidæ

Carcharias microps — *Tubarao*

The *Tubarao* of Madeira proves to be a genuine species of *Carcharias*, as defined by MM Muller and Henle in the Magazine of Natural History for the year 1838 p 35 It is remarkable for the smallness of the eye, and the teeth as reported previously by the fishermen, are really feeble in proportion to its bulk, they are in only two rows, and precisely similar in both jaws The tail is very large and powerful The individual examined measured eight feet five or six inches in length I name it only provisionally and abstain again from attempting a specific character,—deferring in both points, to the expected publication of MM Muller and Henle, amongst whose indicated twenty species ’ it will probably be found

Alopecias superciliosus

At once distinguished from the only other known species of the genus, *Carcharias vulpes*, Cuv , by the enormous eye and its prominent brow I have at present only seen a single young example

XIII —*On the species of Stickleback* (Gasterosteus, *Linn*) *found in Ireland*

By Wm Thompson, Vice-Pres Nat Hist Society of Belfast

In the 'Histoire des Poissons' of Cuvier and Valenciennes, the *Gasterosteus aculeatus* of Linnæus is divided into several species The views there adopted are followed in Great Britain[*] by Mr Yarrell and Dr Parnell in their respective works, but in Mr Jenyns's 'Manual,' four of these species—all that have been recognised as British—are, after a close comparison of examples from the same pond, and of these again with others from different waters, reduced to one species[†] Having myself compared specimens of the fish in question from still more numerous localities than the last-named author, I arrive at the same conclusion in so far as it extends, but go still further, and venture to consider six or seven of the species of the 'Hist des Poiss' as in reality but one, assuming so many different appearances To allude to the extreme accuracy of description characteristic of that truly great work—the 'Hist des Poiss'—would be most superfluous On another point altogether the different view adopted in the present paper turns, namely, on the *permanency of characters* there attributed to the 3-spined *Gasterosteus*

In this genus, Ireland possesses all the forms which are included in the British catalogue An additional one—*G semiloricatus*, Cuv and Val—will be particularly treated of, and come first under notice, as one of the two varieties which are protected with scaly plates throughout the sides

G trachurus, Cuv and Val, t iv p 481

G semiloricatus, Cuv and Val, t iv p 494

March 20, 1835 —On examination of a number of 3-spined Sticklebacks from the island of Rathlin, (sent by Mrs Gage to Dr J D Marshall, who submitted them to my inspection,) I find that in some the lateral plates extend throughout the entire sides, as in *G trachurus*, in others, so far only as in *G semiarmatus*, and in some again no further than in *G leiurus* No other difference can be perceived in these specimens, which are all of a small size, from an inch to an inch and a half in length From between tide-marks in Larne Lough (Mrs Patterson), from oozy and rocky pools over which the tide regularly flows, situated near the edge of Belfast Bay (Richard Langtry, Esq —W T), also from a deep pool in the middle of it (Mr James Nichol)—and from the harbour of Donaghadee (Capt Fayrer, R N), I possess examples of the full-armed Stickleback of various sizes up to 3 inches

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[*] Nilsson in his 'Prodromus Ichthyologiæ Scandinaviæ, published in 1832, thus describes varieties of *Gast aculeatus*, Linn —

"α) Capite, a latere inspecto, magis acuto, spinis dorsalibus longioribus, media longitudinem capitis dimidiam æquante et dimidiam corporis altitudinem superante

"β) Capite, a latere inspecto, magis obtuso, spinis dorsalibus brevioribus, media multo breviore quam ½ capitis et dimid corpor altit —*p* 86

This author makes *G trachurus* synonymous with *G aculeatus*, Linn —he does not offer any opinion on the species of *Gasterosteus* in the 'Hist des Poiss

[†] In a note to p 350, Mr Jenyns observes with reference to *G brachycentrus*, that "it is more than probable that some of the other foreign *Gasterostei* described by Cuvier are mere varieties of this species —*G aculeatus*, Linn

In addition to these Irish examples of the full-armed Stickleback, some 2 inches in length from the Thames, communicated in 1834 by Mr Yarrell, are before me for comparison, and several from 1¼ to 1¾ inch, which I obtained in a marine rock-pool at Ballantrae, Ayrshire, in August 1839

In June 1836, Lieut Davis, R N, sent to the Belfast Museum, from the neighbourhood of Donaghadee, some gigantic specimens, two of which are 3½ inches in length and 10 lines in depth, a third is 3 inches 4 lines long and 9 lines deep, the number of fin-rays is the same in all, viz

D III + 12, A I + 9, P 10, V I + 1, C 12

These three individuals have each 23 plates on the side of the body to the origin of the caudal keel, and thus agree with the *G semiloricatus* Colour as usual in female specimens, no red appearing anywhere With the above were two others of ordinary size, one of which was red on the lower portion of the body Lieut Davis stated in a note respecting them, that they "were found in a pool of brackish water accessible to the sea, at the Foreland rocks near Donaghadee" The example, 2½ inches in length, from deep water in Belfast Bay, differs very much from the large individuals just noticed, in the free margins of the lateral plates, these, in the latter are finely, regularly, and very minutely serrated, while in the former they are distinctly toothed, the denticles becoming larger on the plates as these latter approach the tail The number of these plates to the origin of the caudal keel is about 23, as in the large examples—this number likewise appears in the Thames specimen of *G trachurus* With the exception of a ray less in the anal fin, the number of fin-rays is the same in that under consideration as in the large fish The example, 2 inches in length, from Donaghadee harbour, has likewise about 23 plates on the side to the origin of the caudal keel the serration on the free margin of these plates is intermediate between that exhibited in the specimens from the Foreland Point and the one just noticed from Belfast Bay

In the full-armed Sticklebacks from the localities generally, which have been enumerated, great differences are observable, as—considering for the present adult fish only—in the comparative length of the dorsal and ventral spines, and in the lateral plates In some individuals these do not occupy more than the central portion of the sides, in others the whole sides, and again are intermediate

In the absence either of a specimen for comparison, or a figure to refer to, it may perhaps be considered that certainty cannot be arrived at respecting *G semiloricatus* This fish is stated to differ from *G trachurus* in having only 22 or 23 plates on each side to the origin of the caudal keel instead of its 25 or 26, and in the shoulder-plate (plaque de l'épaule) being larger It has been seen that some of my specimens, and of these, some of the largest size, possess only the number of lateral plates attributed to *G semiloricatus* In examples of equal length, and from the same as well as from different localities, I find the size of the shoulder-plate to vary like other characters Hence I am disposed to regard some of the examples under consideration as this fish

In the 'Hist des Poiss' it is remarked of *G semiloricatus*, 'Nous n'avons pu trouver aux environs de Paris que des épinoches à queue nue, il nous en est venu de pareilles des départemens de la Somme et de l'Oise, de la Rochelle et de quelques autres lieux nous avons observé celle à queue cuirassée dans les ruisseaux des côtes de Normandie, et encore récemment M Deslongchamps nous l'a envoyée de Caen, et M Baillon en a pris dans le Hable d'Ault, lac saumâtre de l'embouchure de la Somme, près du Treport C'est la seule qui se trouve dans les etangs des environs de Berlin, et elle y est en quantité innombrable Peut être est-ce l'espèce qui habite plus fréquemment près des bords de la mer, et qui peut entrer dans l'eau salée Des observations ultérieures nous apprendront sans doute bientot ce qui en est"—*t* iv *p* 494

This accords generally with my own observation, as in seven out of the nine localities whence my specimens mailed throughout the sides were derived—whether they be called *G trachurus* or *G semiloricatus*—they were taken either in the sea or estuary The exceptions are the largest specimens, which were procured in a "pool of brackish water accessible to the sea," and those from Rathlin, obtained in fresh water From the passage just quoted, we learn that the *G semiloricatus* inhabits the pools about Berlin It has always seemed to me not improbable, that in the sea, where the enemies of this diminutive fish are more numerous than in the fresh water, the protecting hand of Nature had as a defence armed its body with these lateral plates That some fishes have the power of accommodating their colour to that of the ground or bottom of the water they frequent, and are thus rendered comparatively inconspicuous to their enemies, is well established

A third species of 3-spined Stickleback, armed throughout the sides like those here treated of, is the *G Noveboracensis*, which, as its name denotes, is found at New York Judging from the description and figure of this fish in the 'Hist des Poiss,' I should not consider it distinct from *G trachurus* or *G semiloricatus* The specimens which have come under my examination differ much in the few characters which are said to distinguish this fish from *G trachurus* The high position of the lateral line is the chief character of *G Noveboracensis*—in some specimens before me this line is so near the back, that three fourths of the body of the fish are below it Our *G Pungitius* is admitted as an American species by Dr Storer in his interesting work on the 'Fishes, &c of Massachusetts' (p 32), and for a copy of which I am indebted to his kindness

The descriptions and figures of the *G obolarius*, Cuv and Val —a 3-spined Stickleback armed throughout the sides, and found in the North Pacific Ocean and the Gulf of Kamtschatka,—are said in the 'Hist des Poiss' to be insufficient to mark it with certainty as a species distinct from the full-armed *Gasterosteus* of Europe or America (p 500)

Dr Parnell, in his 'Fishes of the Frith of Forth' (p 34), after stating that he agrees with Cuvier and Yarrell in considering the *G trachurus* as "a constant and well-marked species," observes that the "square tail" does not exist in the other Sticklebacks According to my observation, it is certainly less developed in them, and generally (but not invariably) corresponds with the protecting side-plates, presenting a greater or less developement accordingly as the armature of the body is of a heavier or lighter cast Dr Parnell further remarks, as corroborative of *G trachurus* being a distinct species, that he has "examined carefully several hundred from half an inch to two inches and a half in length, and in all the specimens the lateral plates were constant." In particular localities I have met with the same result on examining specimens of all sizes of *G trachurus* and of the other varieties also*, but in some places again the different varieties are found together and of every size† Mr Yarrell has so noticed three of them in the Thames at Woolwich, and in Rathlin, as before mentioned, they occur together—in the former locality in brackish, in the latter, in fresh water

G semiarmatus, Cuv and Val, t iv p 493, appears to be the rarest of the 3-spined Sticklebacks in Ireland I possess specimens from the island of Rathlin, as before mentioned, and from Wolfhill, in the neighbourhood of Belfast One example only occurred in the latter locality, where it was taken in 1832 with a number of *G brachycentrus*, the Stickleback of that district—it is indeed this variety in every respect, except in having the lateral plates extending along the sides so far as in *G semiarmatus*, the other characters assigned to this supposed species in the 'Hist des Poiss' are very variable From the half-armed species I turn to the

G leiurus, Cuv and Val, t iv p 487, in which the lateral plates do not extend beyond the pectoral region In every respect but this, it is considered in the 'Hist des Poiss' so similar to *G trachurus*, that the one description is given as equally applicable to both The *G leiurus* would seem to be the most common *freshwater* Stickleback in Ireland‡

The localities whence specimens of this fish are now before me, are—the island of Rathlin,—the neighbourhood of Belfast (W T),—river Bann at Toome (W T),—Portaferry and Newcastle, county Down (W T),—Lough Melvin, county Fermanagh (W T),—neighbourhood of Dublin (Mr R Ball),—Glendalough, county Wicklow (Mr G C Hyndman),—Portarlington, Queen's-county (Rev B J Clarke),—some of the examples from this locality are very handsomely marked, being along the back of a rich brown colour, which is continued down the sides in the form of regular transverse bands upon a yellow ground,—river Shannon, at Killaloe (Rev C Mayne),—Youghal, county Cork (Mr R Ball)

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* The partial exception to this is in *G brachycentrus*, in which the dorsal spines are comparatively longer in young than in adult individuals and hence the young in this respect accord with *G leiurus* I here speak of localities in which all the full grown fish are *G brachycentrus*

† From the many small examples of all the varieties about nine lines in length that have come under my observation, I should think the number of lateral plates they are to possess through life is then as decided as the number of fin-rays, *i e* provided they would have remained in the locality whence they were taken Whether such a change of habitation, as from fresh water to the sea, would cause the smooth sided at any age to put on the lateral armour, may remain a question

‡ From drains which are occasionally replenished by the tide I have also taken it

From Scotland I have specimens obtained in the neighbourhood of Portpatrick by Capt Fayrer, R N Examples from the Thames have been favoured me by Mr Yarrell, and in the river Leam, at Leamington, Warwickshire, the *G leiurus* has occurred to myself Next to this variety naturally comes the

G brachycentrus, Cuv and Val, t iv p 499, which like it, is smooth along the sides from the pectoral region, but differs in the shortness of the dorsal and ventral spines From the comparative length of these spines alone do I distinguish the two varieties, the other characters attributed to *G brachycentrus* being ever varying The Irish localities whence I have this fish, are the neighbourhood of Belfast, and pools along the margin of Lough Neagh (W T), Dublin, Youghal, and Portarlington—supplied from these three localities by the friends before mentioned

The largest example which has come under my observation was one taken by myself in England, at Stow Pool, Lichfield, in July 1836, and which was noticed in the 'Proceedings of the Zoological Society' for the next year This is the only allusion I have seen to the *G brachycentrus* in Great Britain

This variety, which from the shortness of its spines is the most defenceless of the 3-spined Sticklebacks, we should, *à priori*,—i e if the suggestion respecting the full-armed variety be correct—expect to find where it has fewest enemies, and such, according to my very limited observation, is the case This would seem to be the variety more peculiar to still water, in which it often attains a very large size The only continental notice of this fish known to me is that in the 'Hist des Poiss,' where it is stated to have been obtained by M Savigny in the brooks of Tuscany

The following comparison between *G brachycentrus* from the neighbourhood of Belfast, and specimens of *G leiurus*, &c from the Thames, favoured me by Mr Yarrell, was drawn up early in 1834 —

In form of outline the Irish fish generally differs much from the *G leiurus* the latter being from the centre of the back alike gracefully sloped on either side to the head and tail giving that part a handsome and finely arched appearance the under side of the body also exhibits more of this form than that of its congener The back of the Irish species, instead of thus sloping gradually to the centre is at that part rather flat, and is at least as high where the dorsal fin originates as elsewhere The Irish fish is in proportion to its depth longer than the *G leiurus* as specimens of the latter under 2½ inches in length when compared with Irish specimens 3 inches long, proved of equal dimensions (8 lines) at the deepest part The difference is also strongly marked in the relative breadth of the two species the Irish maintaining considerable breadth throughout even to the origin of the caudal fin The *teeth* in the lower jaw of the Irish species consist in the centre of about four rows irregularly disposed, but become gradually less numerous towards the back of the mouth, where they terminate in a single line the upper jaw contains three rows in front the outer and inner being regular in distribution In number the *G leiurus* which I examined does not possess so many teeth as that species but in their arrangement there is little difference On reckoning the *vertebræ* in a specimen of the *G leiurus* and in one of the Irish Sticklebacks of similar length, I find that the number in the latter exceeds that in the former species and that they are throughout more regularly equidistant than in the *G leiurus*

In the three English Sticklebacks, *G trachurus, G semiarmatus* and *G leiurus* the bony plate covering the head is much stronger than in the Irish fish—the outline of the lower jaw more angular—the lips smaller and less fleshy—the number of rays in the fins different, consisting generally in the Irish specimens of twelve in the dorsal ten in the pectoral eight in the anal and twelve in the caudal In the three English *Gasterostei* also, the ventral spine is longer, but not so broad as in the Irish fish—the dorsal spines considerably longer and the plates whence they spring proportionately larger The following is the measurement of the spines in the four species

	Total length of fish		First dorsal spine	Second	Ventral
G trachurus	2 in	1½ lin	2¼ lin	2¾ lin	4 lin
G semiarmatus	2	6	2½	3	4½
G leiurus	2	6	2½	3	4½
Irish species, G brachycentrus	3	0	1½	1¾	3¼

In the last species* the membrane extends to the extremities of all the spines

About Belfast I have taken the smooth-sided Sticklebacks—*G leiurus* and *G brachycentrus*—from ditches in the low grounds, from clear mountain-streams at an elevation of 600 feet above the level of the sea, from the muddy rivers Blackwater and Lagan, and from water which was partially salt (here *G leiurus* only), when, contrary to what might be expected, the largest were invariably found where the temperature was lowest, specimens there (*G brachycentrus*) not uncommonly attaining the length of three inches, and perfectly free from the pearl-like tumours, which, adhering to the body, infest those inhabiting the comparatively warm waters of the lower grounds This short-spined Stickleback here exhibits, in all respects, the same colours as the most common of the English varieties, of many of the larger individuals captured in the month of September, about the one-half were red on the under parts In large shoals too I have remarked fully this proportion to have assumed the scarlet, and in the early summer months have observed that full-grown fishes, in which the most intense shade of this colour prevailed, never appeared to be with spawn*, very few in that state being so much as faintly tinged with it This *Gasterosteus* and the Trout (*Salmo Fario*) seem not to co-exist in some of our smaller rivers, or do so very partially In the stream whence the largest of these were taken trout (*Salmo Fario*) were a dozen years ago very common, and the Stickleback unknown, and it is only since the almost total disappearance of the Trout that this fish has been established in its waters In a similar stream issuing from the same mountain-range at about four miles distance, the Trout yet maintains its place, and in the parts of the river frequented by it I have in vain looked for the Stickleback

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* Agreeably to the view taken in the 'Hist des Poiss, the term "species was here applied to *G brachycentrus* I was disposed at the time (1834) to regard it as a local variety, but had not the means, which have since been afforded by a comparison of specimens from numerous localities, to arrive at a certain conclusion on the subject

The figure of *G brachycentrus* in the 'Hist des Poiss' resembles the Irish fish when in spawn, and not its usual appearance

In addition to that fish, there is another 3-spined Stickleback, brought by M Savigny from the brooks of Tuscany, described as new in the 'Hist des Poiss'—from its brilliant operculum, it is named *G argyropomus* In this and the other characters assigned to it, Irish specimens in my possession fully accord It is suggested, indeed, with reference to the characters attributed to this and the two other *Gasterostei*—*G brachycentrus* and *G tetracanthus*—brought by M Savigny from Tuscany—" Nous allons les indiquer, pour engager les observateurs à s'assurer de leur constance," p 498 In the next page it is however remarked of *G brachycentrus*, that there is no doubt of its being a true species†

Four-spined Stickleback, *G spinulosus*, Yarr and Jenyns Among specimens of *Gasterostei* kindly procured for me at

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* So late as the 19th Sept 1832, I remarked one large with spawn

† The different varieties of the 3 spined Stickleback are commonly known in the North of Ireland by the name of Spricklebag—evidently a corruption of the proper term—Pinkeen is applied to them in the South, and from the Shannon they have been sent me under the name of Thornback

La Bergerie, near Portarlington, Queen's-county, by the Rev B J Clarke, is an individual with four spines It is 1¼ inch long, the first and second spines are of ordinary length, the third spine is short, but exceeding the fourth In no other character than that of having four spines, does this fish differ from the 3-spined examples taken with it, and consequently I cannot look upon it otherwise than merely an accidental variety of G *aculeatus*, Linn It was among a parcel, consisting of G *leiurus*, G *brachycentrus* and G *Pungitius*, taken in a pond and in some neighbouring drains The "ascending plate from the base of the ventrals" (see Jenyns's Manual, p 350), I find subject to variety of form like other parts

That the fish under consideration is the G *spinulosus*, seems to me not to admit of doubt*

Ten-spined Stickleback, G *Pungitius*, Linn

This diminutive fish is "rare"—as has already been noticed by Templeton †—in Ireland, comparatively with the 3-spined species The localities whence I possess it are very few in number, viz —pits excavated in brick-making on the banks of the Blackstaff river, near Belfast, a marsh in the neighbourhood of Portaferry, county Down (W T), and La Bergerie, Queen's-county (Rev B J Clarke)—from this locality a considerable number were sent, and among them the largest native specimens I have seen, a few being 1¾ inch in length, and one having attained to 2¼ inches

From the neighbourhood of Portpatrick, Scotland, this species has been sent me by Capt Fayrer, R N For examples from the Thames I am indebted to Mr Yarrell, and in the river Leam, near Leamington, Warwickshire, it has occurred to myself

In most of the above localities the 3-spined species was taken with the G *Pungitius* All of the latter, whether from brackish or fresh water, are smooth throughout the sides (G *lævis*, Cuv 'Regne Animal,' 2nd ed ‡), and but a very few individuals present any appearance of a keel on the sides of the tail The dorsal spines vary from nine to eleven in number, and do so in examples of equal size from the same place

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* Since the above was written, I have been gratified to find that my friend Dr Johnston in a 'List of the Fishes of Berwickshire exclusive of the Salmones, considers the G *spinulosus* a variety only of the 3-spined species—of these he notices the "Rough tailed, Half-armed, and Smooth-tailed Sticklebacks' of Yarrell, as varieties only of one species (See Report of the Berwickshire Naturalists Club for 1838, p 171)

† Mag Nat Hist vol i New Series

‡ See also Hist des Poiss t iv p 507

Fifteen-spined Stickleback*, *G Spinachia*, Linn

This species, differing from *G aculeatus* and *G Pungitius* in being strictly a marine fish, is found around the coast of Ireland I possess examples obtained at Rathlin, in the north (by Dr J D Marshall), Bundoran, in the west (W T), Youghal, in the south (by Mr R Ball), and on the coasts of Down (W T), and Antrim (by Mrs Patterson), in the north-east

On the southern coast, where sprat-fishing is regularly practised, the *G Spinachia* is taken in greater quantity than in the north Mr R Ball on one occasion knew as many to be captured with the Sprat (*Clupea Sprattus*), at Youghal, as would "fill a bushel," and at Glendore and the south-west coast of Cork generally, Mr G J Allman informs me that it is often taken at the same time with this fish On the coast of Down full-grown specimens have occasionally occurred to me when dredging, and likewise under stones between tide-marks, and one or two individuals may sometimes be seen in the fish-market at Belfast, whither they are brought with quantities of the Atherine (*Atherina Presbyter*) from Portaferry, in the winter and early spring In the rock-pools, on different parts of the coast, the fry of *G Spinachia* may be observed in the month of June about three-quarters of an inch in length, and in such places I have at Bangor (county Down), in the middle of September, captured them of twice that size, where in winter neither young nor adult examples ever occurred to me

Both the *G aculeatus* and *G Pungitius* were included in Dr Patrick Brown's 'Catalogue of the Fishes of Ireland,' published in Exshaw's Magazine for 1774—the former species was noticed two years before in Rutty's 'Natural History of the County of Dublin' In M'Skimmin's 'History of Carrickfergus,' and in Mr Templeton's 'Catalogue,' the *G Spinachia* has a place

In one respect the foregoing pages may be considered rather as exhibiting a retrogression than an advancement of the subject, as in them an attempt is made to restore what have latterly been considered as several species simply into the three described by Linnæus as *Gast aculeatus*, *G Pungitius* and *G Spinachia*

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* Horn-eel is a common name for this species in the North

XIV.—*Notice of Plants and Animals found in the Sulphureous Waters of Harrowgate and Askern, Yorkshire.* By E. LANKESTER, M.D., F.L.S., &c.

IN the distribution of organized beings over the surface of the earth, we generally find an adaptation of the former to the various conditions of the latter.

In many marked cases this adaptation is so great, that organized beings cannot exist but in the peculiar circumstances in which they are first engendered. From this law arises the great variety of organized beings which we find adapted to occupy almost every existing condition of matter. There are, however, some conditions of the inorganic kingdom in which organic beings have not been detected, as excessive cold or heat, the absence of oxygen or the presence of injurious gases, &c. The extent, however, of these exceptions is continually on the decrease, and animated beings or their remains are now found in circumstances which but a few years since would have been thought quite impossible. For an increasing knowledge on this point we are in a great measure indebted to the use of the microscope. By its agency both animal and vegetable productions can be detected in almost all conditions of matter, so that it is difficult to say, with the exceptions of the extremes of heat and cold, under what combination of agencies we might not expect to find a plant or an animal. This extensive adaptation of the one kingdom to the other can now be demonstrated to be essential to the welfare of the whole, as in many instances the lower organic beings derive existence from, and convert into their own substance, those elements which would be destructive of the existence of beings higher in the scale of life. Hence the investigation of this department of science becomes interesting to the physiologist.

Among those conditions of matter which, from their powerful influence on man, might be supposed to be destructive of all animal life, are some varieties of those waters which, from the nature of their contents, are called mineral. Some of these have a temperature exceeding greatly that of the human body, yet many of them contain both plants and animals; in fact, wherever the former are found we may anticipate the existence of the latter.

On the present state of our knowledge with regard to the composition of mineral and thermal waters a report has already appeared, drawn up by Dr Daubeny at the request of the British Association for the Advancement of Science; in this report reference is made to the existence of both animal and vegetable matter in many cold and thermal springs

Amongst the substances found in sulphureous springs is one called *glairine*, which has for a long time been recognised by continental chemists, and was carefully investigated by Professor Anglada, who thought it resulted from the chemical action of some of the constituents of the water in which it was found Dr Daubeny has also investigated this substance, and, in opposition to the opinion of Anglada, believes it to arise entirely from organic matters in the waters in which it occurs This notice first induced me to ascertain if this substance was present in the sulphureous waters of Askern and subsequently in those of Harrowgate, and the result has been the detection of forms of animal and vegetable life in circumstances in which I had not previously suspected them

Previously to Dr Daubeny's investigation, Dr Willan had announced the presence of a peculiar organic substance in the waters of Croft in Yorkshire, which Dillwyn named *Conferva nivea*, and many French and German chemists had described organic matters in mineral waters, as resin of sulphur, humus, extractive, Baregine, zoogene, &c , &c

As great medicinal virtues have been attributed to these substances, they have in certain quarters attracted considerable notice, but not having visited any of the mineral waters of the continent with the view of investigating them, I am not able to say how far those which I have found at Harrowgate and Askern may resemble those described on the continent, and shall only endeavour in this place to point out the nature of certain substances in these waters, which appear to resemble those spoken of by continental writers

Throughout the whole district in which Askern is situated, the soil in many places, and the mud in the ditches and pools, when tested, gives very decided proof of the existence of sulphuretted hydrogen At certain seasons of the year many of these spots are covered with a whitish-looking Conferva, which I have supposed to be the *Conferva nivea* of Dillwyn The specimens obtained from off the sulphuretted mud of waters which contain no sulphuretted hydrogen, present a greenish fibre, surrounded by verticilli of numerous smaller fibres This appears to be the plant in a mature stage of growth If however a small portion of the mineral water be put aside, it will in the course of a little time present on the sides of the vessel in which it is contained a whitish-looking substance, which, on being examined by the microscope, exhibits a mass of very delicate fibres The same fibres are found to constitute the white substance which collects around the sides of the sulphur wells, as well as at the bottoms of the cisterns and the pipes through which the water is drawn

In places where this substance has been allowed to collect for some time, a layer of darker fibres will be found to have formed, which present all the characters of the fibres collected from the sulphuretted mud of the running streams From this circumstance I have been led to suspect that the two are but different forms of the same plant If this white substance be kept in a warm room it decomposes and gives out a sulphurous smell, which is stronger and more disagreeable than that of sulphuretted hydrogen A film also collects upon the surface of the water, and in this state it corresponds very closely to Anglada's description of *glairine* In one instance I observed this substance to form in a glass-stopped bottle of sulphur water, from which the atmospheric air was excluded, with the exception of a small globule which existed in the neck of the bottle It forms, however, most rapidly when exposed to the atmosphere, and so quickly does this process go on, that the stone vessels into which the water runs over at the Bath-houses, if cleaned in the morning, will be found covered in many places by night When exposed to the air the sulphur water is constantly depositing small portions of the salts which it holds in solution which, in places where it is undisturbed, mix with the vegetable fibres and present themselves in the form of crystals mixed with the fibres In this state, when collected and dried and submitted to heat, it gives out sulphurous acid gas Some of the sulphur of this compound may be precipitated from the water, but from the smell of the fibres in decomposing, I am inclined to think that they themselves contain sulphur, and that this is the agent which determines their existence and peculiar form

Being at Harrowgate during the past summer, I was desirous of confirming the existence of this substance in the sulphur water there In most of the wells I found on their sides deposits varying in colour and appearance The different-coloured deposits were arranged in layers, so that on examining a portion it presented several layers one above the other The principal layers are green, white and red On examining the green layers I found them to consist of simple fibres of a dark green colour, with transverse bands of a darker shade, resembling some of the species of *Oscillatoria* The white I found to consist of opake masses of a crystallized character, which were probably salts deposited from the waters by evaporation and the escape of carbonic acid The red I shall have occasion to mention presently, only observing now that Anglada mentions having observed *glairine* sometimes of a red colour

In the specimens I brought with me from Harrowgate I could not find the *Conferva nivea,* but in Hooker's 'British Flora' it is stated to have been found at this place

All the substances which have been enumerated have been referred to very different sources for their origin Thus Anglada supposed *glairine* to be of chemical origin, whilst others referred it to the vegetable kingdom, and a third class of observers have referred a similar compound to the animal kingdom, calling it zoogene, &c The different states, in which these substances are presented by nature, would undoubtedly add to these various conclusions I am not however aware that those who have referred this substance to the animal kingdom have observed living animals in the waters from which it has been taken Dr Daubeny remarks in a note, that Turpin had found in the substance called *Baregine* the remains of Infusoria, but no writer that I am aware has recorded the fact of the existence of living animals in waters impregnated with sulphuretted hydrogen

I have however met with several species of animalcules in these waters, two of which I have more particularly examined, and will now describe In an analysis of the waters of Askern, published in 1817, the author observes, "Nearly allied to the vegetable kingdom is a singular substance found in a pond at the south corner of the pool This substance is a powder of a pink or rose colour, which forms a thin covering on the sand and mud at the bottom of the pond"—(*Brewerton*)

On reading this, I immediately had recourse to the spot, and found the substance lying on the mud of the ditches near Askern, which are strongly impregnated with sulphuretted hydrogen I at first thought it to be of vegetable origin, and sent some to Mr Berkeley for the purpose of ascertaining his opinion From the state in which I sent it he supposed it might be a species of *Protococcus,* at the same time putting to me the query whether it might not be of animal origin At that time I had seen nothing to lead me to suspect this, unless it might have been the excretion or ova of a beautiful rotiferous animalcule resembling the *Philodina roseola* of Ehrenberg, which is very abundant in the waters of the pool at Askern After having kept some specimens of the red substance in water exposed to the air, I observed the water one morning of a deep rose colour, and on examining it found it to contain an immense number of very minute animalcules I now had a clue to the origin of the red substance, and from subsequent examinations found that the red colour of the water and the deposits depended on this animalcule, in the same manner as water is found of a green colour and having green deposits, from the presence of the *Cercaria viridis*, the green matter of Priestley

From this time I looked out more particularly for this red substance, and soon found that it occurred very extensively in the ditches and pools at and near Askern Its appearance is however very fluctuating, sometimes covering a large surface of the bottom of the pool with the appearance of red velvet, at other times not a spot is to be seen At first I did not suspect at all the connection of this animalcule with the sulphur springs, until I observed it most abundant in the watercourses that received the overflowings of the pumps and wells used for drinking and bathing This induced me to examine the water or mud in which I afterwards found it to occur, and I invariably found, on dipping in a piece of silver coin, that it presented the usual action of sulphuretted hydrogen So constantly has this been the case, that by this means I have detected sulphuretted hydrogen in spots where I should not have thought it existed In the red colour before alluded to of the deposits around the sides of the wells at Harrowgate, I recognised the same substance as existed at Askern Whilst at Knaresborough, I observed this rose-coloured matter in the mud of the water before it passes into the rock which forms the dropping-well, and on plunging a shilling into the mud, it came out presenting the usual discoloration from sulphuretted hydrogen

The animalcule is very minute, not more than the ten thousandth of an inch in diameter Its form is oblong, frequently presenting a contraction in the middle of its body, and presenting from two to ten or twelve stomachs Its line of movement is straight, with a somewhat serpentine movement of the body

On looking over Ehrenberg's great work on Infusoria, I have not been able to refer it to any of the genera there given, although from its size and the circumstance of its producing a red deposit, it would seem to be his *Astasia hæmatodes* I cannot, however, distinguish in it a tail, which is a generic character of *Astasia* The *A hæmatodes* was discovered by Ehrenberg at the bottom of a lake in the steppe of Platow in Siberia

I have frequently found another animalcule with this and sometimes alone, forming a deposit of a much lighter colour, having a whitish red or brickdust colour It is a much longer animal, and has the motions of a *Vibrio*, but not its bead-like form It possesses from ten to twelve stomachs

Both these animalcules live in water artifically impregnated with sulphuretted hydrogen, whilst I have found that other kinds are effectually destroyed by such treatment

Besides the vegetable and animal forms above mentioned, the sulphur waters during their decomposition afford others, especially under the films that collect on the surface of the water

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XV —*Remarks upon the Recent and Fossil Cycadeæ* By J Morris, Esq

The Cycadeæ, originally placed by Linnæus and Jussieu among the Ferns, are an interesting family of plants, from their appearing to form an intermediate place between the Palms, Ferns and Coniferæ, resembling the first in their external habit, the second in the gyrate vernation of their leaves (a character not belonging to the whole family), and related to Coniferæ in the ovula being uncovered, or not furnished with any seed-vessel The affinities of these families, although previously mentioned by C Richard*, were, in this latter respect, finally determined by Mr R Brown in his researches into the structure of their reproductive organs, inserted in the Appendix of Capt King's 'Voyage to Australia'

The stems or trunks of Cycadeæ are generally simple, although some species of *Zamia* appear capable of dividing into two or three terminal buds In *Cycas* the internal structure consists of a central pith surrounded by two or more circles of laminated vascular and cellular tissue alternating, in *Encephalartos* the central cellular tissue is divided from the external by only one circle of woody fibre† "The stems are enclosed in no true bark, but have a thick case composed of the persistent scales which have formed the bases of fallen leaves, these, together with other abortive scales, constitute a compact covering that supplies the place of bark"—(*Buckland*‡)

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[*] 'Mem sur les Conifères et Cycadées, 1826, p 183 "Il n est aucune famille de plantes qui ait plus de rapports et de ressemblance avec les Conifères que celle des Cycadées Ces rapports nous semblent si grands, que nous pensons qu il est impossible de distinguer ces deux familles, ni par des caractères tirés de leurs fleurs, ni par des caractères puisés dans l organisation de leurs fruits Les seuls signes distinctifs qui existent réellement entr' elles consistent uniquement dans leur port et la structure anatomique de leur tige, qui en effet est fort différente dans l'un et l autre groupe'

M Richard, however, appears to have been unaware of the internal structure of *Cycas* being stratified, but describes it as similar to that of Palms '*C circinalis*, Arbor , ligno albicanti, molli uti in arboribus monocotyledonibus disposito'

[†] In a specimen of *E spiralis*, for which I am indebted to the Messrs Lee of Hammersmith, the external circle of cellular tissue is wanting

[‡] Some interesting observations on the structure of the tissues of Cycadeæ have appeared by D Don, Esq, Libr L S Mr Don remarks, that "the

The family is diœcious. The inflorescence consists of a strobiliform spike, from the under surface of the scales of which the polleniferous thecæ proceed; in *Zamia* these thecæ are separated into two distinct masses, while in *Encephalartos* and *Cycas* they form a confluent mass.

The female inflorescence of *Zamia* and *Encephalartos* is similar to the male cones in form, having thick scales, each bearing on the superior surface two naked ovula, while in *Cycas* the naked ovula are seated in depressions on the edges of a frond but little altered from the ordinary structure.

The foliation of this family consists of pinnate fronds, the circinnate vernation of which, in a young state, has generally been considered a character belonging to all the genera; but a series of observations on the development of the frond which I have had an opportunity of making in several species of the three existing genera, have led me to an opposite conclusion, from which it is evident that even in *Cycas* itself the rachis is constantly straight in the early state; when however twelve or more fronds rise together, the outer ones become incurved at their extremities, apparently for the purpose of affording some protection to the more delicate fronds within, which remain perfectly straight: the only parts to which the term circinnate can be strictly applied, are the young segments or pinnæ. In the evolution of the fronds the development proceeds from the base upwards, each pair of pinnæ becoming unrolled as soon as that part of the rachis has attained its full degree of extension and size.

A correct figure of the young frond of *C. circinalis* is given in Rheede's 'Hortus Malabaricus,' vol. iii. t. 15. f. 2, 3, 4; and one of *C. revoluta* is figured in plate xi. fig. 4, 5, 'Mag. Nat. Hist.' 1840, from a specimen obtained from Mr. Anderson, of the Chelsea Botanic Garden.

The prefoliation of *Zamia* and *Encephalartos* presents but little difference from each other; the young rachis is slightly recurved at the apex, the two series of pinnæ being regularly imbricated, and applied to, or in contact with, each other by

great peculiarity of the Coniferæ, and which distinguishes them as well from Cycadeæ as from every other family, is the remarkable uniformity of their woody tissue, which consists of slender tubes, furnished on the sides parallel to the medullary rays with one or more rows of circular or angular dots; but in Cycadeæ no such uniformity is observable, their tissue, as in other phænogamous plants, consisting of two kinds of vessels, namely, of slender transparent tubes, without dots or markings, and of dotted, reticulated and spiral vessels, which are capable of being unrolled. The former are identical with the fibrous or woody tissue, whilst the latter, which form a part of each bundle, can only be compared to the strictly vascular tissue of other plants.—(Proc. Linn. Soc. Feb. 4, 1840.)

their anterior surface See *E horrida*, pl 11 f 2 and *Z pygmæa* and *pumila*, f 1, 3 'Mag Nat Hist' April 1840 I had made these observations on the prefoliation of this family, when examining the extensive collection of species belonging to the Messrs Loddiges of Hackney (who kindly furnished me with any specimens I required), previously to my attention being called by Prof D Don to some remarks by M Miquel on this subject, and as they appear to differ from my own, owing probably to the period at which the young frond was examined in both instances, I shall insert an abstract from M Miquel's memoir, with a view of calling the attention of botanists to a further investigation of this subject

"In *Encephalartos affinis*, Lehman, a bud is composed of young leaves foreshortened (raccourcis), the tops of which converge at the summit, and the pinnæ on each side of the rachis, in consequence of this foreshortening, are imbricated and placed in contact one with another by the anterior surface The same curious fact is observable in *E Altensteinii* and *horridus*, Lehm In species of this genus the terminal bud generally develops itself at an interval of two or even more years, and in young plants or the lateral buds of large stems it is often only developed by a single frond, or by a very limited number at one time The increase of the young fronds is produced by the extension of the rachis and pinna *E spiralis*, Lehm, presents exactly the same character In the *Zamia*, Lehm, the fronds are developed in a totally different manner In *Z pumila* and *media*, in the bud, the young rachis is rolled into the form of a crozier, but the two series of pinnæ are imbricated on each side, and are joined one with another in such a manner that their tops are directed downwards, occasioned by the circinnate disposition of the rachis In the young fronds of *Cycas circinalis* and *revoluta*, Thun, the rachis as well as the pinna are rolled in the form of a crozier, each having a peculiar line or axis of circinnation, the same as in Ferns*"

The remains of fronds supposed to belong to this family being rather numerous in a fossil state, and as the structural characters vary in the three recent genera, I shall give a slight description of the pinnæ and their mode of attachment, illustrated by a woodcut of each type

Cycas —Pinnæ linear, lanceolate, entire acute having a single thick midrib† attached to the rachis by their whole base, the lower part of which is slightly decurrent

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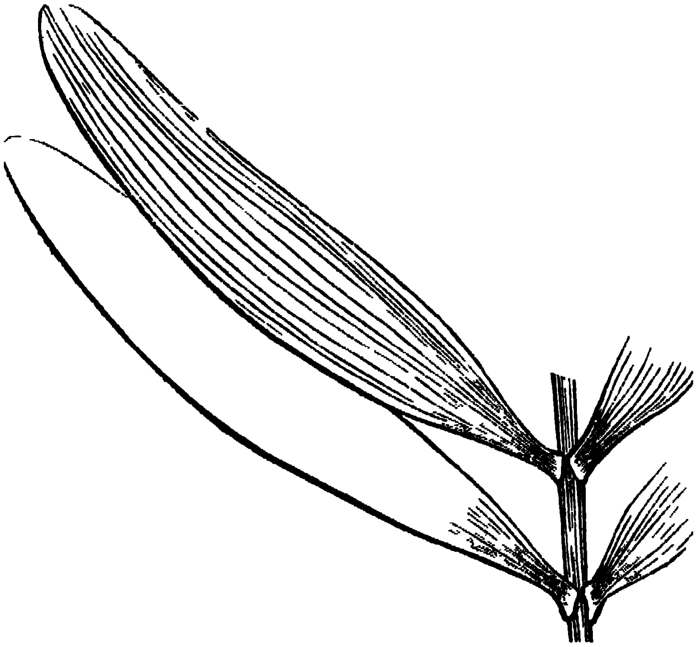
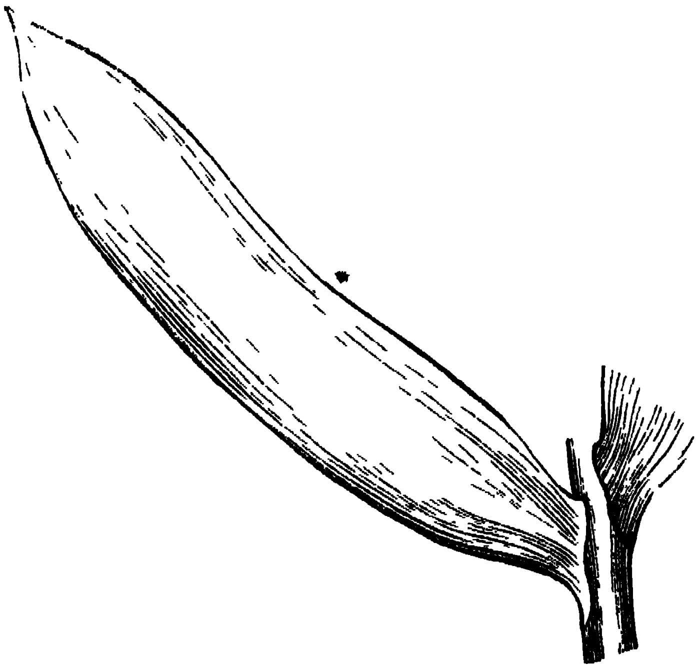
* Bulletin des Sciences Physiques de Néerlande, t i p 129

† In carefully examining the cellular substance of the pinnæ, small veins may be seen passing between the midrib and the margin

Zamia —Pinnæ ovate, lanceolate, attenuate, entire or dentate, having numerous fine equal veins parallel or slightly divergent, simple or sometimes forked Pinnæ contracted towards the base, and articulated to the rachis by a whitish callosity



Encephalartos —Pinnæ varying in form, opposite or alternate, having simple or forked veins (thicker than in *Zamia*), and frequently terminating in spines or serrations towards the apex, attached by their whole base to the rachis



The genera of this family differ in their geographical distribution The five species of *Cycas*, viz *C circinalis*, *revoluta*, *squamosa*, *glauca*, and *angulata*, are natives of China, India, Japan, the Molucca Islands and New Holland

The nine species of *Zamia*, viz *Z angustifolia*, *tenuis*, *media*, *debilis*, *integrifolia*, *pygmæa*, *furfuracea*, *muricata* and *pumila*, are confined to the new world, their native habitats being the West Indies and the tropical regions of continental America

The fifteen species of *Encephalartos*, viz *E pungens*, *cycadifolia*, *tridentata*, *longifolia*, *Caffra*, *lanuginosa*, *Lehmannii*, *Cycadis*, *horrida*, *latifolia*, *spiralis*, *prunifera*, *repanda*, *Frederici Gulielmi* and *Altensteinii*, belong to Southern Africa, only one species being found in New Holland*

Fossil Cycadeæ

Dr Buckland, in the 'Geological Transactions,' first called the attention of geologists to the fossil stems of this family from the Isle of Portland the analogy of which was pointed out by Mr Brown, remains of the fronds had however been previously described by Count Sternberg in his 'Flora der Vorwelt,' and Ad Brongniart also noticed them as occurring at Hoer in Sweden†, the most abundant locality at the present time are the shales belonging to the oolitic series of Yorkshire whether all the remains usually associated with this family really belong to it, may be difficult to decide, as many of them present characters very different from the existing species, which do not at the same time assimilate them to any other living genera Ad Brongniart, an authority on these subjects, has considered most of the simple pinnate fronds with parallel venation to belong to Cycadeæ, but it is much to be regretted, that the portion of his work ('Hist des Vég Foss') which would comprehend this family is not yet published, so that we might have the full benefit of a continuation of the same masterly observations which have thrown so much light on the fossil Cryptogamia

The classification in the following catalogue will be nearly the same as that adopted by most authors on this subject

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* The following observations are extracted from Lindley and Hutton ('Fossil [illegible]ora, ii p 122), respecting the geographical position of *Encephalartos* "They are not met with at Cape Town, where they would be exposed to the cold winds from the southern polar regions, but first appear far in the interior of the country, in the land of the Caffers, where the common Cape Flora of Proteas and Heaths is replaced by strikingly different races of plants They prefer mountainous and wooded or bushy country, following the ranges of hills, but not straggling into the plains They are generally met with in rocky places, almost 2000 feet above the level of the sea, higher than the region of Mimosas, and surrounded by bushes, arborescent succulent plants, Rhamneæ, Celastrineæ, and shrubby Leguminous species "

† Ann des Sc Nat tom iv

CYCADEACITES, *Presl*

CYCADITES *Brown*

Trunks exhibiting the usual structure of *Cycadeæ*

Fronds pinnate, pinnæ linear, entire adnate at the base, traversed by a single thick midrib

Stems

C columnaris, Presl Sternberg, Flora der Vorwelt part 7, 8 t 47 f 1—6 Near Radnitz Bohemia

C involutus, Presl *l c* t 51

C Bucklandi Presl, *l c* p 194 *Conites Buckl*, Sternb, part 3, p 39 t 30 Oolite, Stonesfield

C cylindricas Mantellia, Brong Prod pp 93 and 96 Lias Luneville, Strasburg

C cyprinopholis, Mem Agric Soc Lyons, ii p 129 t 3 f 1—5 C M Mines de Rive de Gier

Fronds

C salicifolius Presl *l c* t 40 f 1 2 Lignite, Altsattel, Bohemia

C angustifolius, Presl *l c* t 44 Lignite, Altsattel Bohemia

*C ? Nilssonii** *Spadix* of Hisinger Let Suec, t 33 f 4

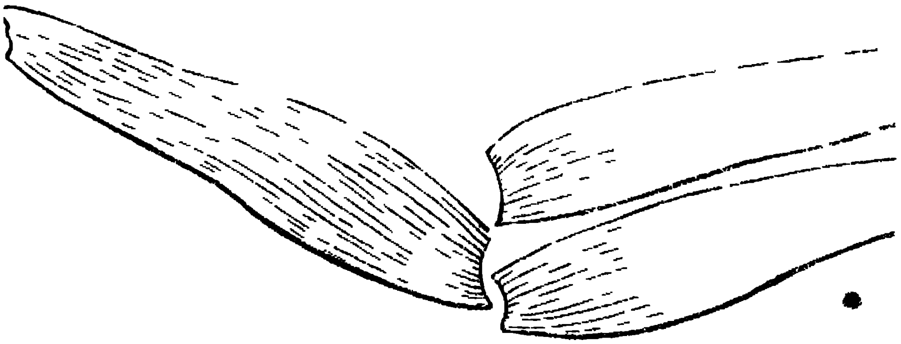
C ? Nilssonii Phillips Geol of Yorkshire t 7 f 24 Oolite Yorkshire

ZAMITES, *Brong*, *Presl*, &c

Fruit strobiliform, oval, pedunculate with large imbricated scales spirally arranged (Presl)

Stems cylindrical or nearly spheroidal without a distinct axis covered by rhomboidal cicatrices (Brong)

Fronds pinnate, pinnæ sessile, distichous, entire or dentate pointed, sometimes contracted sometimes enlarged at the base



Stems —*Cycadeoidea* Buckland, *Mantellia* Brong

Z Cordai Presl Sternb Flor, part 7 8 p 196 t 55 C M Radnitz Bohemia

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* The portion of a frond figured by Hisinger under this name appears to belong to a *Fucus* with a central rib, by the club shaped termination of which it may have been attached I do not know how any worn or broken *Cycas* leaf could assume this form

*Z megalophyllus**, Presl *l c* p 196 *Cyc meg*, Buckl, *Mantellia nidiformis*, Brong Prod p 96 Oolite Isle of Portland

Z microphyllus, Presl *l c* p 196 *Cyc micro*, Buckl Oolite, Isle of Portland

Z pygmæus, *Cycadites* Lindl and Hutt, 2 t 143 Lias Lyme Regis

Z ? Brongniarti Presl, *l c* p 196 *Endogenites echinatus* Brong, Class Veg Foss p 43 t 5 f 2 Soissons

Strobiles

Z crassa Lindl and Hutt, 2 t 136 Wealden Isle of Wight

Z macrocephala, L and H 2 t 125 Greensand near Deal

Z ovata L and H 3 t 226 *a* Greensand? Feversham

Fronds

Pinnæ contracted at the base

Z distans, Presl *l c* p 196 t 41 f 1 Keuper Bamberg

Z lanceolatus L and H, 3 t 194 Low Ool Shale Haiburn Wyke, Yorkshire

Z undulatus, Presl *l c* p 197 *Odontop undulatus* Sternb, pt 5 and 6 p 78 t 28 f 1

Pinnæ broad at the base

Z gigas, Lindl and Hutt, 3 t 165 Ool Shale, Scarborough

Z ? giganteus Hist Let Suec, t 33 f 5

Z ? Schlotheimii Presl *l c* p 200 *Cyc zamiafolius*, Sternb pt 4 p 33 t 43 f 2 C M Mannebach *Poacites zeæformis* Schloth Pet t 26 f 1, 2

Z palmatus Cycadites, Sternb, pt 1—4 t 40 f 1

Z longifolius Brong Prod p 94 *Cycadites sulcicaulis* Phillips Geol Yorkshire, pt 1 t 7 f 21 *Ctenis falcata* Lindl and Hutt, 2 t 103 Ool Sh Gristhorpe Bay

Presl considers this to be a Fern

PTILOPHYLLUM

Stem ——? Fronds pinnate pinnæ linear, closely approximated, more or less elongate, base variable in form, oblique, round, imbricate, sometimes auricled in the upper and sometimes in the lower part Veins slender equal parallel †

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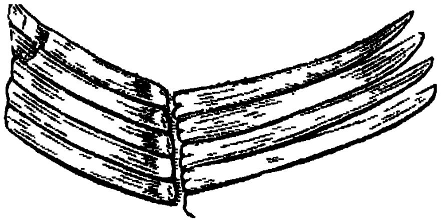
* Presl has placed these fossil stems with *Zamites*, to which they appear to have a greater affinity than to *Cycadites*, more especially since the interesting discovery by Mr R Brown of the existence of scalariform vessels without discs in the trunk of *Z microphyllus*, a character in which they agree with the American portion of the recent order Mr Brown remarks "that the order Cycadeæ presents but one genus in America, namely the *Zamia*, on which this genus was originally founded, and to which it has been recently restricted, and that the coincidence in the structure of the scalariform vessels in the trunk of this *Zamia* of the new world, with that of the fossil *Cycadites* of Europe, is very remarkable (Buckl B T Sup Notes)

† I am indebted to Mr Lonsdale, of the Geological Society, for first pointing out to me some fossils from Cutch, belonging to Col Grant, in

This section has been proposed to include those species of fronds hitherto classed with *Zamites* but from which they differ in the variable form of the base of the pinnæ and their imbricated character Ad Brongniart appears to have been aware of this structure (Prod p 91) and has referred them to *Zamites* but this name ought to be restricted to those fossils agreeing more closely with the recent genus The oblique attachment and auricled base are characters not well marked in any recent species, and whether attached by the whole or only a portion of the base, may be difficult to decide from the compressed state of the specimens -- an opinion that might be formed from inspecting casts obtained from pressed leaves of some of the Coniferæ (*Cunninghamia lanceolata*) in which the broad basal attachment (in the cast) would be very deceptive



No specimens of this section have yet been found with the vernation of the young fronds although I believe Ad Brongniart considers he has discovered unequivocal evidence of the gyrate vernation of *Nilssonia* This section is readily distinguished from *Pterophyllum* by the pinnæ being narrow and of nearly equal breadth throughout a character in which they agree somewhat with the young state of *Encephalartos spiralis* and *E cycadis* and the broader ones resemble other forms of that genus but it would be preferable to retain them here although their affinity to *Zamites* is very evident if the concave basal attachment of *Z gigas* may be considered an intermediate form

Pinnæ narrow

P acutifolium Geol Trans, 2nd series, vol v t 21 f 1, 2, 3 Ool, Cutch

P Cutchense, Geol Trans 2nd series, vol v t 21 f 4 Ool, Cutch

P Bucklandi Z Buckl Presl *l c* pt 7 8 p 198

P æquale Pterophyllum dubium, Ad Brong Prod p 95, Hist Let Succ t 33 f 8 *Nilssonia æqualis*, Brong Ann des Sc Nat 4 t 12 f 6 Lias? Hoer, Sweden

P pecten, *Pterophyllum pecten* Lindl and Hutt 2 t 102 *Cycadites pecten* Phillips, Geol Yorks, t 7 f 22 Gr Ool, Gristhorpe Bay

P Jægeri Pterophyllum Jægeri Brong Prod p 95 *Osmundites pectinatus* Jæger Keuper?

P dubium Cycadites plumula, Presl *l c* pt 7 8 p 195 *Filicites dubius*, Sternb, pt 1—4 t 33 f 1 Oolite Yorkshire

This may only be a variety of the next species

P pectinatum Zamia, Brong Prod p 94 Lindl and Hutt 3 t 172 *Filicites scolopendrioides*, Lindl and Hutt, 3 t 229 (excl synon) Stonesfield slate *Ool shale**, Saltwick, Yorkshire

which these characters are well exhibited, they are figured* in the 2nd part of vol v of the 'Geol Trans

* Mr Williamson, in a memoir published in the Geol Trans vol v, considers most of the Yorkshire plants as belonging to the great oolite

The *Filicites scolopendrioides* of Lindley (not of Brongniart, from which it is very distinct, Brongniart's figure representing merely the fructification of an entire leaf Lindley's figure that of true pinnæ) has been placed as a synonym of *Z pectinata* although it differs in having the pinnæ wider apart and more obtuse at the apex, not important specific characters

P taxinum, Zamia taxina, Lindl and Hutt, 3 t 175 Stonesfield slate

I am informed, from a recent communication of Prof Phillips, that the fossils figured in his Geology of Yorkshire' under the names of *Cycadites lanceolatus* (*Zamia Mantelli,* Br) *C gramineus* (*Z elegans* Br) and *C latifolius* (*Z Youngii* Br) ought to be placed in the Otopteroid division of Ferns the veins losing themselves in the upper margin Seven or eight other species are named in Ad Brong Prodromus the characters of which are not given viz *Z Feneonis acuta patens, lævis Goldiæi Buchanani pennæformis*

Pinnæ broad

P falcatum, Zamites, Presl *l c* pt 7 8 p 197 *Odontopteris falcatus,* Sternb pt 5 and 6 p 78 t 23 f 1 Inf Ool Whitby

P Schmeidelii Presl *l c* p 197 *Odon Schmeidelii,* Sternb pt 5 and 6 p 78 t 25 f 2 Hornstone Baruth

P lanceolatum, Geol Yorksh Young and Bird, t 3 f 2 'The leaf with long lanceolate striated leaflets' Oolite Yorkshire

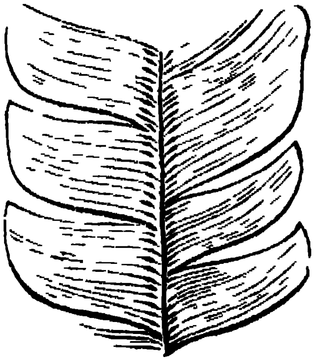
The peculiar character which distinguishes this section from *Zamites* may be easily remarked by comparing the attachment of the pinnæ in any of the above species with that of *Z lanceolatus* 'Foss Flor' 3 t 194

PTEROPHYLLUM, *Brong*

Fronds pinnate, pinnæ sublinear inserted by their whole base apex truncate, sometimes acute, veins fine, equal, slender, parallel, but little marked

Apex truncate

P majus, Brong Ann des Sc Nat, 4 p 219 t 12 f 7, Hist. Let Suec, t 33 f 6



P minus Brong Ann des Sc Nat 4 p 219 t 12 f 8 Hist Let Suec t 33 f 7, Lindl and Hutt, t 67 f 2 Oolite, near Scarborough

P comptum, Lindl and Hutt t 66 *Cycadites comptus* Phillips t 7 f 20 Oolite, near Scarborough

P Munsteri, Presl, *l c* p 198 t 43 f 1 Keuper, Bamberg

P truncatum, Presl *l c* p 198 *Asplenopteris Nilssoni* Sternb pt 4 t 43 f 3—5 Hoer, Sweden

P Nilssoni, Lindl and Hutt, 2 t 67 f 1 *Asplenopteris Nilssoni,* Phillips Geol Yorksh, t 8 f 4 Oolite, Scarborough

P filiciformis, Zamites filiciformis Presl *l c* pt 7 and 8 p 198 *Filicites dubius,* Sternb pt 4 p 23 t 47 f 1

P obtusum Odontopteris obtusa Brong Hist Veg Foss, t 78 f 4

P latifolius O latifolius Sternb, pt 5 and 6 p 79 *Tæniopteris latifolius* Brong, t 82 f 6

Apex acute

P acuminatum, Zamites, Presl, *l c* p 198 t 43 f 2 Keuper, Bamberg

P Brongniarti Cycadites Mantell Geol S E England, p 238 Wealden Sussex

P heterophyllus Zamites Presl, p 199 t 43 f 4 5 Keuper Bamberg

P tenuicaulis, Cycadites Phillips, pt 1 t 7 f 19 Gr Ool Gristhorpe Bay

P difformis Zamites, Presl *l c* pt 7 8 p 198 *Aspleniopteris difformis* Sternb, pt 4 p 21 pt 2 t 21 f 1 Bohemia

The following species I have not seen —

P longifolium Brong Prod, p 95 *Algacites filicoides* Schloth Nachtr p 46 t 4 f 2 Lias

P Meriani Brong Prod p 95 Lias

P Williamsonis Brong Prod, p 95 Inf Ool, Whitby

P enerve, Brong Prod, p 95 Variegated marl

NILSSONIA, *Brong*

Fronds pinnate, pinnæ approximate oblong, more or less elongate, apex rotundate, adhering by their whole base veins unequal, parallel

N brevis Brong, Ann des Sc Nat 4 p 218 t 12 f 4 Hist Vet Suec Hoer, Sweden

N elongata Brong *l c* t 12 f 3 *Zamites,* Presl, *l c* p 198 Hoer, Sweden

N proxima, Cycadites Nilssoni, Sternb, pt 1—4 t 47 f 1

The above is an outline of some of the characters in the recent and fossil Cycadeæ, the geological position of which is equally interesting with their recent affinities A few species are found in the carboniferous beds of Bohemia and in the new red sandstone of Germany, and some have also been met with in the cretaceous series of Denmark and Sweden, but their great development appears to have been during the Jurassic period thirty species occurring in the oolitic formation of England and three in that of India Thus they seem to have formed the characteristic vegetation of that age, intermediate between the abundant Cryptogamic tribes of the carboniferous æra and the dicotyledonous flora of the tertiary series

The great number of fossil species supposed to belong to this family has probably suggested the remark by Prof Don, that the recent species " constitute the remains of a class of plants which belonged to a former vegetation "

The interesting specimens of fossil fructification, apparently furnished with a stem belonging to this family, which exist in the collections of the British Museum, Mr Bean of Scarborough and Mr Saull of London etc have not been alluded to in this paper they probably constitute a new genus from being generally associated with fronds having a peculiar character first pointed out to me by M Konig, and I shall reserve any remarks on this subject until I have completed some observations on the internal structure of the stem and its affinity to *Zamites*

XVI —Carabideous *Insects collected by* Charles Darwin, Esq, *during the Voyage of Her Majesty's Ship Beagle* By G R Waterhouse, Esq

[Continued from vol vi p 355]

Genus Feronia

Sp 1 *Feronia Corinthia*, Dejean, Species général des Coléopteres, tom iii p 304

Molops Corinthia Germ Col sp nov p 21

Of this species Mr Darwin obtained many specimens at Maldonado, La Plata and two specimens are labelled Monte Video It is the *Carabus striatulus* of Fabricius the original specimen of which is contained in the Banksian collection I speak without hesitation, having compared Mr Darwin's specimens with the original with Dejean's description, and also with three specimens sent from the continent by different parties, all bearing the same specific name

The *Feronia Corinthia* is readily distinguished from all the *Feronia* of the southern portions of South America hitherto discovered, by its large size, and the elytra being deeply striated towards the suture and almost smooth externally The *Feronia chalcea* of Dejean is closely allied to the present species, having very nearly the same general form and similar sculpturing to the elytra, but in size it is much inferior *F Corinthia* being 8 lines in length whilst *F chalcea* is only 5¾ to 6 lines in length the former is brassy black and the latter is of a brassy colour inclining to æneous

Sp 2 *Feronia chalcea*, Dejean, Sp général des Coléop tom iii p 308

Four specimens of this species were brought from Maldonado, La Plata by Mr Darwin

Sp 3 *Feronia cordicollis*, Dejean, Species général des Coléop tom iii p 306

Seven specimens of this species occur in Mr Darwin s collection five of which are from Monte Video, and two from Maldonado, La

Plata It is easily distinguished from other Patagonian *Feroniæ* hitherto discovered by its comparatively depressed form, the small size of its head, cordiform thorax black colouring and the want of wings By candle-light the elytra display a beautiful iridescence (steel-blue being the prevailing colour) as in the *Pterostichus brunnipes* or *iridipennis* of Stephens in size it very nearly agrees with that insect but the *F cordicollis* has a much smaller head and thorax and the latter is more attenuated behind

A specimen of this species has been sent to Mr Hope with the specific name of *obsidianus* but I have not yet found it described under that name

Sp 4 *Feronia Dejeanii*

Fer alata nigra nitida thorace cordato postice foveis duabus impressis elytris elongatis subparallelis distincte striatis interspatiis aliquantò convexis

Long corp 7½ lin lat 2½ lin

Hab Monte Video

This species resembles the *Feronia Corinthia* of authors, but is a trifle less than that insect the thorax is less convex, and although considerably contracted behind is less suddenly so than in *F Corinthia* the posterior foveæ are large and shallow instead of being in the form of a deep longitudinal groove the elytra are distinctly striated throughout and not as in the species last mentioned obliterated on the outer portion of each elytron The present insect, moreover differs in being of a black colour—there is perhaps a slight trace of the æneous tint

From *Feronia cordicollis* which is found in the same locality and which in the somewhat depressed form of the thorax, it resembles, the *F Dejeanii* may be at once distinguished by the comparatively large size of its head its possessing wings the thorax being rather less contracted behind the posterior foveæ being broad the elytra more elongate and of a more parallel form, the striæ impunctate and the antennæ stouter, its size rather exceeds that of *F cordicollis* and consequently that of *F chalcea F assimilis*, and *F simplex* of Dejean

Description —Head large, but slightly narrower than the thorax the eyes rather prominent, two longitudinal deep grooves are situated on the forepart of the head Thorax truncated behind, the widest part very near the anterior angles the sides not very much rounded and the hinder part much narrower than the opposite extremity, the dorsal channel distinct but not extending either to the anterior or posterior margins, the posterior foveæ large shallow, and impunctate or at least very nearly so—some very minute punctures being discernible under a strong lens these foveæ extend to the posterior angles, and occupy nearly two thirds of the space between them and the dorsal channel Elytra elongate, the sides nearly parallel being very indistinctly dilated in the middle the striæ are rather deep and impunctate and the interspaces are slightly convex two impressed points are observable on the second stria from the suture situated on the hinder half of the elytron and there is an impression on the third stria situated on the anterior half of the elytra This insect is of a glossy black colour throughout—on the upper parts there is a very indistinct metallic gloss

Mr Darwin found but one specimen of this insect

Sp 5 *Feronia submetallica*

Fer alata nigra, supra nigro ænea, thorace sub-cordato, postice foveis duabus punctulisque impresso, elytris paulo elongatis subparallelis distinctè striatis interspatiis leviter convexis

Long corp 6½ lin Lat 2⅓ lin

Hab Maldonado La Plata

This species is about equal in size to the *F cordicollis* of the same country, and rather larger than the *F macer* of Europe In many respects it is intermediate between the *F Corinthia* (or *striata*) and the *F cordicollis* the head is proportionately rather larger than in the latter but considerably less than in the former species in the sculpturing of the elytra it greatly resembles the *F Dejeanii* and differs from *F cordicollis* in having the striæ impunctate and from *F Corinthia* in having these striæ distinctly continued throughout the surface of the elytra The thorax is less attenuated behind than in either of these species being *very nearly* of equal width in front and behind

Description —Head triangular in front of the eyes (which are tolerably prominent), suddenly contracted, and cylindrical behind the eyes, with two longitudinal irregular impressions in front thorax rounded at the sides and but slightly attenuated and truncated behind the dorsal channel distinct the anterior and posterior transverse impressions indistinct, and the posterior foveæ in the form of longitudinal grooves*, rather short and deep and minutely punctured Elytra moderately long and but slightly broader in the middle than near the extremities the striæ moderately deep and impunctate, and the interspaces are slightly convex, two abbreviated striæ near the scutellum on the second stria from the suture are two impressed points situated on the hinder half of each elytron, and on the third are one or two similar impressions The general colour of the upper surface of the body is brassy black, the under parts of the body, as well as the legs, antennæ and palpi, are black

But two specimens of this species were brought home by Mr Darwin one is from Maldonado, La Plata and the other from Monte Video

Sp 6 *Feronia assimilis*, Dejean, Sp gén des Coléop , Suppl , tom v p 773

A *Feronia*, agreeing well with Dejean's description of the above-mentioned species, was found by Mr Darwin at Monte Video It is about the same size as the *Feronia macer*, and, like *F cordicollis*, is of a black colour, but may be distinguished from that species by its smaller size the thorax being almost as broad behind as before, and the palpi, basal joint of the antennæ and the tarsi being pitchy red

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* None of the South American *Feroniæ* which I have seen, have more than one fovea on each side at the base of the thorax, and in this respect they differ from those European forms (such as *F melanaria*) in which there are two channels on each side

Sp 7 *Feronia (Pterostichus) Bonellii*

Fer aptera atra, thorace cordato posticè utrinque bistriato, elytris elongato ovatis striatis striis obsolete striatis antennis ad basin piceis palpis tarsisque rufo piceis

Long corp $5\frac{1}{2}$—$5\frac{3}{4}$ lin lat $1\frac{9}{10}$—2 lin

Hab Ynche Island, Chonos Archipelago Valdivia and E Chiloe

This species is about the same size as the *Feronia oblongo punctata*, and it also approaches that insect in form the head is rather narrower the thorax is narrower longer and more attenuated behind the elytra are of the same ovate form but a trifle more elongated the antennæ are also longer It has the general form and appearance of the species of Bonelli s genus *Pterostichus*

The eyes are moderately prominent and the frontal sulci are short and rather deep the thorax is rather depressed as long as broad considerably attenuated behind, and the posterior angles are right angles, there is sometimes a slightly impressed transverse groove in front and there is also in some individuals a transverse groove behind the dorsal channel is not very distinct the posterior fovea, on each side is in the form of a narrow long groove and is impunctate the elytra are elongate ovate distinctly striated and the striæ are generally faintly punctured especially those nearest the suture and towards the base of the elytra but this is not constant in some specimens the striæ being impunctate, the elytra are slightly sinuated at the apex and have some distinct impressed points on this part there are also one or two impressions on the third stria from the suture the palpi and tarsi are pitchy red, and the three basal joints of the antennæ are pitchy

The specimens from Ynche Island have the elytra more deeply striated than those from Valdivia, one of the Valdivia specimens is considerably broader than the others, and the elytra have a purplish hue

Sp 8 *Feronia ærea*, Dejean, Spe gén des Coléop tom iii p 279

This appears to be a common species in the neighbourhood of Valparaiso I have seen many specimens from that locality —Mr Darwin s collection contains five It is very nearly equal in size to the *F Corinthia*, and of the same brassy black colour, it differs however in having the thorax less convex, rather longer not so narrow behind and less suddenly contracted at this part the elytra are rather deeply striated throughout and are impunctate

The *Omaseus marginalis* of Curtis (Linn Trans vol xviii p 191) I have compared, and found to agree with these specimens, they however appear to me to agree with Dejean s description of *F ærea*, and in Mr Hope s cabinet there is a similar insect bearing the same name

Sp 9 ***Feronia Nebrioides, Omaseus Nebrioides,*** Curtis Linn Trans vol xviii p 191

In Mr Darwin s collection are four specimens of this species, two of which are from E Chiloe, one is from Valparaiso, and the fourth is from Concepcion

F Nebrioides greatly resembles *F aerea* in colour, form, and sculpturing, but is not more than half its size The *Feronia erratica* of Guerin (Mag de Zool pl 226 fig 3) agrees very nearly with this species but there is no mention of the brassy tint of the upper parts which is observable in the *F Nebrioides* in the figure there is an admixture of green in the colouring

Sp 10 *Feronia lucidus Pterostichus lucidus* Curtis, Linn Trans vol xviii p 192

This species greatly resembles the *F chalcea* of Dejean but in that insect the sides and apical portion of the elytra are almost smooth the striæ being obliterated on those parts as in *F Corinthia* whilst in *F lucidus* the striæ are distinct throughout the elytra

Sp 11 *Feronia meticulosa,* Dejean, Spé général des Coleoptères, Suppl tom v p 762

Three specimens of this species occur in Mr Darwin s collection they are from Valparaiso This insect no doubt is allied to that division of *Feronia* called *Steropus*, but is remarkable for having the *second third, fourth* and *fifth* striæ of the elytra less distinct than the sutural stria and those on the outer margin in one of the three specimens the intermediate striæ are almost obliterated, but in the others they are more distinctly marked

Sp 12 *Feronia (Steropus) marginata*

This is a new species closely allied to the last, having the intermediate striæ of the elytra almost obliterated those on the margin of the elytra are remarkably distinct, and give to the insect a peculiar appearance , it is less than half the size of *F meticulosa,* which is about equal to the *F octopunctatus* In both species the elytra appear to be soldered together

Fer picea, vel nigra , antennis pedibusque rufo piceis thorace subquadrato, angulis posticis rotundatis , elytris oblongo-ovatis, striatis, striis intermediis obsoletis

Long corp $3\frac{3}{4}$—4 lin , lat $1\frac{1}{3}$—$1\frac{1}{2}$

Hab Chile

This species bears a considerable resemblance to the *Taphria vivalis* The head is somewhat rounded in front, and the eyes are but little prominent , the frontal grooves are scarcely discernible The thorax is about one-third broader than the head, about equal in length and breadth, somewhat convex, a little broader before than behind, and the anterior and posterior angles are rounded , the dorsal channel and posterior foveæ are indistinct The elytra are of an oblong ovate form not very much broader than the thorax, and slightly sinuated at the apex , the sutural stria is distinct but not deep, and impunctate , the four following striæ are almost obliterated and on the second of these or the third from the suture are two distinct impressed points the foremost situated towards the base of the elytra and the other near the middle on the outer margin of each elytron are three distinct striæ, that nearest the margin has numerous impressed points, and these impressions become more near to each other as they approach the apex of the elytra The antennæ are rather shorter than the head and thorax taken together testaceous red at the base and becoming paler towards the tip and the palpi are of the same colour the legs are pitchy red and the thighs are pitchy the outer margins of the elytra are pitchy beneath

Mr Darwin found numerous specimens of this species both at Valparaiso and Concepcion they vary a little in the form of the thorax, most of the Valparaiso specimens are a trifle smaller and have the thorax rather narrower than those from Concepcion, but there are others from Valparaiso which perfectly agree with the Concepcion specimens, and some which are intermediate

Sp 13 *Feronia* (*Pœcillus*) *Peruviana* Dejean Spé gen des Coleop tom iii p 233

The collection contains several specimens from Callao

Sp 14 *Feronia* (*Pœcillus*) *Chaudoirii* Guerin, Mag de Zool pl 227 fig 3 ?

An insect brought by Mr Darwin agrees very well with Guerin s description of *F Chaudoirii* it is closely allied to the *F unistriatus* of Dejean but judging from his description (for I unfortunately have no specimens for comparison) it differs in having the frontal sulci well marked the mandibles pitchy red, and in being rather larger, viz 5¼ lin etc , but upon turning to Guerin's fig 3 of pl 227, I find an insect represented which does not at all agree with the description of *Chaudoirii* I should imagine the figure to be that of some other genus, it is very like a species of *Melanotus* there must be some mistake

Sp 15 *Feronia* (*Pœcillus*) *Guerinii*

Fer nigra, nitida thorace subquadrato, sulco dorsali mediocri impresso, nec non posticè foveis duabus, punctulisque elytris distinctè striatis, striis subpunctatis, antennis, palpis tarsisque piceis

Long corp 5 lin , lat 2 lin

Hab Patagonia ?

But one specimen of this species was found by Mr Darwin at sea, about sixty miles from the nearest land (but much further in the direction of the wind) Rio de la Plata In size it is intermediate between the *F Peruviana* and the *F unistriata* and it is easily distinguished from both these species by its elytra being distinctly striated throughout, the striæ being punctured, and there being small scattered punctures on the hinder portion of the thorax between the posterior foveæ compared with *Pœcillus cupreus* it presents the following differences size a trifle smaller general form rather nar rower head and thorax decidedly narrower, the latter with the posterior foveæ more marked, and the elytra rather more distinctly striated

Head narrow, eyes moderately prominent, frontal sulci not deep thorax subquadrate, the sides slightly rounded, dorsal channel distinct posterior foveæ in the form of narrow grooves, and rather deep, the space between these foveæ is punctured but the punctures are not very numerous, and the space between the foveæ and the outer angles of the thorax is impunctate elytra oblong ovate, distinctly striated the striæ punctate, but the punctures are not very distinct antennæ with the three basal joints blackish in the middle, but with the extremities red the remaining joints brown palpi pitchy red legs pitchy black, the tarsi pitchy red The upper parts of this insect are black, but I fancy I can trace some slight shades of blue and think it probable it is a dark variety of a species having metallic colouring like the *F unistriatus*

I have named this species after M Guérin Meneville, whose works have done much towards the elucidation of the various branches of Natural History, and more especially the entomological department

Sp 16 *Feronia* (*Pœcillus*) *depressa*

Fer subdepressa nigra supra cuprea vel æneo cuprea, thorace subquadrato postice utrinque striato elytris elongatis, subparallelis distincte striatis antennis palpisque fuscis his atque illis ad basin rufescentibus pedibus nigris tibiis piceo-rubris

Long corp 5⅓—5¾, lat 1¾—2 lin

Hab Monte Video

This species is a trifle less than *Pœcillus lepidus*, and of a more depressed form and the striæ on the elytra are not quite so deep

Head rather large and obtuse in front eyes very prominent the frontal sulci very deep thorax but slightly convex, nearly square, the sides but slightly rounded, and the fore part somewhat contracted both anterior and posterior angles rather obtuse dorsal channel tolerably distinct posterior foveæ in the form of narrow and tolerably long impunctate grooves, and situated about midway between the dorsal channel and the outer margin of the thorax elytra somewhat depressed, and having the sides nearly parallel, distinctly striated thoughout the striæ impunctate, an impressed point on the second stria from the suture towards the base of the elytra and two similar impressions on the stria situated on the hinder half of the elytra antennæ shorter than the head and thorax and rather thick the three basal joints testaceous and the remainder brown palpi testaceous the apical joints somewhat pitchy legs black, anterior tibiæ pitchy red tarsi and posterior tibiæ pitchy

The above description is drawn up from three specimens from Monte Video

The following species belong to the sub-genus *Argutor* —

Sp 17 *Feronia* (*Argutor*) *Patagonica*

Fer lata, nigra, thorace subquadrato, sulco dorsali mediocri, foveisque duabus, impresso, elytris piceo nigris, distinctè striatis striis impunctatis antennis, palpis, pedibusque piceo rubris, abdomine ad apicem rufescente

Long corp $3\frac{1}{4}$ lin lat $1\frac{1}{4}$ lin

Hab Maldonado, Monte Video S^{ta} Fe etc

This species may possibly be the *F oblita*, or perhaps the *F Bonariensis* of Dejean, but that author has not described those insects with his usual care, and after much trouble I have been unable to satisfy myself on this point In all the specimens before me (eleven) the elytra are more or less pitchy the margin is distinctly pitchy red beneath, and the terminal segment of the abdomen is of the same colour as well as the legs palpi and antennæ In Dejean's account of the two species above-mentioned, they are described as *black* with pitchy red legs

Fer Patagonica is about the same size, or a trifle less than *Argutor vernalis* but the head and thorax are narrower and the latter is more contracted behind the elytra are rather more ovate and the frontal sulci are more distinct

Eyes moderately prominent frontal sulci short and moderately deep thorax about equal in length and breadth, rather narrower behind than before the sides form a gentle and even curve from the anterior almost to the posterior angle and the outer margin meets the posterior margin so as to form nearly a right or slightly obtuse, angle the dorsal channel is distinct and the posterior foveæ (one on each side) are in the form of narrow grooves there are no punctures on the thorax elytra considerably broader than the thorax, and of an oblong-ovate form the striæ moderately deep and impunctate, a short rudimentary stria is observable on each side near the scutellum

In some of the specimens the body and thorax are red beneath but most commonly these parts are of a pitch colour, the terminal segment of the abdomen is always paler than the other parts The specimens, moreover, vary somewhat in the form of the thorax the posterior angles being sometimes almost acute and in one or two of the specimens there is a distinct transverse impression on the hinder part of the thorax a specimen from Monte Video has no wings Notwithstanding these differences I am convinced, after a careful examination, that they are all the same species

Sp 18 *Feronia (Argutor) Brullei*

Fer alata piceo-nigra thorace subquadrato postice striis punctulisque impresso, elytris subparallelis, profunde punctato striatis antennis palpisque testaceis pedibus piceo-rubris

Long corp $3\frac{1}{4}$ lin lat $1\frac{1}{3}$ lin

Hab S^{ta} Fé Buenos Ayres

This species very nearly agrees in size with the *Argutor vernalis*, but is of a narrower form and the antennæ are proportionately longer, reaching when extended backwards, considerably beyond the base of the thorax The general colour of the upper parts of the body is black slightly inclining to pitchy the suture of the elytra and outer margins are suffused with pitchy red, the under parts of the body are pitchy black, the mandibles and legs pitchy red and the thighs assume a deeper hue in the middle, the antennæ and palpi are testaceous Eyes moderately prominent, frontal sulci small and not deep thorax subquadrate slightly attenuated behind, the lateral and posterior margins forming a right angle on each side at their junction dorsal channel moderately distinct, the posterior fovea on each side in the form of a long narrow groove, which extends to the posterior margin, the space between these foveæ is punctured, but the punctures are not very numerous elytra considerably broader than the thorax, and with the lateral margins nearly parallel deeply punctate striated—no abbreviated striæ near the scutellum

But one specimen of this insect was brought home by Mr Darwin, it is easily distinguished from the preceding species by its distinctly punctate striæ I have named it in honour of one of the authors of the Histoire Naturelle des Insectes now in course of publication

Sp 19 *Feronia* (*Argutor*) *Audouini*

Fer alata nigra thorace subquadrato angulis posticis subrotundatis linea transversa striisque duabus impresso elytris paulo elongatis profunde striatis striis impunctatis antennis palpisque testaceis pedibus rufo piceis

Long corp 4 lin, lat $1\frac{1}{2}$ lin

Hab Sta Fé, Buenos Ayres

This species is rather larger than *Argutor vernalis*, the antennæ are proportionately longer and more slender the thorax is almost precisely the same form excepting that the posterior angles are somewhat rounder, the elytra are considerably longer Eyes but moderately prominent and having two rounded and somewhat deep foveæ between them thorax broader than long the anterior and posterior parts of equal width, and with the anterior and posterior angles slightly rounded, dorsal channel distinct, and extending from the anterior to the posterior margins, posterior foveæ in the form of long narrow grooves which extend to the base of the thorax and are connected by a tolerably distinct transverse groove, there are no punctures on the thorax elytra elongated, and rather deeply striated the striæ impunctate

Sp 20 *Feronia* (*Argutor*) *apicalis*

Fer alata, nigra, thorace subquadrato postice angustiore, angulis posticis obtusis, striisque duabus impresso, elytris nigris vel piceo nigris ad apicem et marginem externum piceo rubris, antennis palpisque testaceis pedibus rufo piceis

Long corp $4\frac{1}{2}$—4, lat $1\frac{1}{3}$—$1\frac{1}{2}$ lin

Hab Maldonado, La Plata

Three specimens of this species, from the locality just mentioned are contained in the collection, they all have a distinct pitchy red patch at the tip of the elytra, a character which suggested the name

Head ovate, eyes but little prominent, two foveæ in front joined by a transverse impression, thorax nearly equal in length and *chondria*, the curved, double-pointed, needle-formed spiculum, fig 5 Plate III The variation in their diameters is exceedingly great, one of the smallest measuring but the seven thousand one hundred and sixtieth of an inch, while the fragment of a large one imbedded near it (fig 6 Plate III) was the seven hundredth of an inch in diameter There are numerous grains of sand and other extraneous matters imbedded in the fleshy substance along with the spicula

Upon examining with a power of five hundred linear the outer surface of the small portions of the sponge which I had removed from the specimen, I observed patches of a very fine reticulated structure, which is beautifully and faithfully represented by the artist Mr Aldous at fig 7 Pl III It is composed of a very minute fibre, imbedded in a transparent membrane The interstices are somewhat irregular hexagons in the piece represented in the figure, but in another part of the same small piece of sponge, which did not exceed the eighth of an inch in length, some of them were nearly square, while others were elongated to such an extent as to assume the form of nearly regular oblong areas The fibre of this cuticular network has every appearance of being solid, it is extremely minute, not exceeding the ten thousandth part of an inch in diameter The average diameter of the interstices of the reticulations figured is the two thousandth of an inch, while the fibre of the mass of the sponge varies from the three hundredth to the three thousandth of an inch in diameter, and the smallest spiculum I could find was, as before stated, the seven thousand one hundred and sixtieth of an inch at its greatest diameter From the whole of these circumstances, there is little doubt that this delicate reticulated membrane is the true cuticle of the sponge Upon examining a small slice from near the base of the body of the sponge, I had the satisfaction of observing the group of gemmules, or eggs of the sponge, represented by fig 8 Pl III , but I could not, from the cutting in my possession, satisfactorily determine whether they were attached to the fleshy substance of the sponge, or to the fibrous skeleton, although in several of them, which had apparently been disturbed by the removal of the thin slice from the sponge, the point of attachment of the gemmule was very apparent when viewed with a power of five hundred linear The diameters of the gemmules varied considerably, the largest I could find measured the three hundred and fifty-fifth part of an inch, and the smallest the one thousand one hundred and forty-third of an inch in diameter

Upon examining another species of keratose sponge in a similar state of preservation, which is in the collection at the

British Museum, I found precisely the same mode of structure to prevail The horny fibres were completely enclosed in a fleshy or cellular structure, in which numerous slender siliceous spicula were imbedded

From the nature of the structures exhibited in both of these keratose* sponges, and the prevalence of siliceous spicula in such abundance in the fleshy or cellular structure which surrounds the horny fibres, there is very strong reason to suspect that the fibre of the sponges of commerce will prove, in its natural state, to be surrounded by a similar fleshy matter, and that spicula will be found in a like manner to those I have described as existing in the two species mentioned in this paper

DESCRIPTION OF THE PLATE

Fig 1 The sponge of its natural size

Fig 2 The interior of the sponge, as seen with a power of 120 linear, *a*, the horny fibre, surrounded by the fleshy substance, *b*, *b*, spicula imbedded in the fleshy substance

Figs 3, 4, 5 and 6 Various forms of spicula found imbedded in the fleshy substance of the sponge

Fig 7 A view of the cuticle of the sponge, as seen with a power of 120 linear

Fig 8 A view of the interior of the sponge, with the gemmules imbedded in the fleshy substance, seen with a power of 120 linear

XVIII —*Notices of European Herbaria, particularly those most interesting to the North American Botanist*†

THE vegetable productions of North America in common with those of most other parts of the world have generally been first described by European botanists, either from the collections of travellers or from specimens communicated by residents of the country who, induced by an enlightened curiosity, the love of flowers, or in some instances by no inconsiderable scientific acquirements, have thus sought to contribute according to their opportunities, to the promotion of botanical knowledge From the great increase in the number of known plants it very frequently happens that the brief descriptions and even the figures of older authors are found quite insufficient for the satisfactory determination of the particular species they had in view, and hence it becomes necessary to refer to the herbaria where the original specimens are preserved In this respect, the collections of the early authors possess an importance far exceeding

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[* The term *keratose* seems objectionable, though sanctioned by authority since *ose* is not a proper termination for adjectives from the Greek, and analogy would require the *κ* in *κερας* to be expressed by a *c*, as in centaur, not kentaur, &c Would not *ceratine*, or *corneous*, be better?—ED]

† Communicated to Silliman's American Journal by the Author, probably Dr Gray

breadth, rather narrower behind than before the posterior angles obtuse, dorsal channel indistinct, the posterior fovea on each side in the form of a long narrow groove, which extends to the hinder margin no punctures on the thorax elytra elongate, striated the striæ impunctate those nearest the suture the most deep, the others rather faint antennæ scarcely reaching beyond the hinder margin of the thorax and of a red colour, as well as the palpi, legs pitchy red mandibles pitchy In one specimen the thorax is pitchy black and the elytra pitchy in the other two specimens the thorax, as well as the head is black in all the specimens the outer margins of the elytra are pitchy and the reflected portion is pitchy red

This species is considerably larger than either of the preceding being equal in size to the *Calathus piceus*

Sp 21 *Feronia* (*Argutor*) *Chilensis* Dejean Spéc gén des Coléop , tom iii p 251

Of this species there are three specimens two of which are from Valparaiso and the third is from S Chiloe

[To be continued]

XVII —*Observations on a Keratose Sponge from Australia*
By J S Bowerbank, Esq , F G S

To the Editors of the Annals and Magazine of Natural History

Gentlemen,

I am not aware that modern naturalists have published the results of any examination of the structure of the Keratose or Horny Sponges while in that state of perfect preservation, such as they would be if alive, or immediately after their removal from their native element The skeletons of these curious animals are familiarly known to every naturalist, but in this state they have undergone decomposition of the softer parts of their substance, and the descriptions handed down to us by former writers, based upon the examination of such specimens, have unavoidably led to the propagation of erroneous ideas of their true nature and structure In a paper read before the Microscopical Society, January the 27th, 1841, I have shown that even in this state they possess a much higher and more complex form of organization than they had hitherto been supposed to exhibit, and that, contrary to received opinions, they are furnished with siliceous spicula, which are imbedded in considerable abundance in some of the larger fibres of their solid horny skeletons

Since the publication of these facts, I have had the opportunity afforded me by the kindness of Mr J E Gray, of examining a specimen of this class of Sponges which was brought home from the Swan River, Australia, by that indefatigable naturalist Mr Gould, preserved in spirit immediately after it was taken from the sea It is a young specimen of a well-known Australian species, of which I have several specimens, and is represented of its natural size at fig 1 Pl III It is elevated on a short foot stalk, which, like the body of the sponge, is of a compressed form In the specimen figured, the greatest breadth of the body of the sponge is but little more than equal to its height, but in the other specimens in my possession it has attained a much greater height, and in one case rather exceeds thirteen inches, including the footstalk, which is about two inches long The height of the body in this adult specimen is to the breadth as three to one

When removed from the spirit, the sponge has a dense, opake and fleshy appearance, and feels weighty and solid to the touch Upon taking some very thin slices from about the centre of one of the broadest surfaces of the sponge, and examining them with a power of 120 linear as transparent objects, they presented a highly interesting view of the structure The horny fibre of the sponge, agreeing exactly in appearance with that of the specimens in my own possession, was seen ramifying in every direction in the form of an amber-coloured network, the interstices of which were filled up with a fleshy substance very similar to that which occurs in such abundance in the freshwater Spongilla and in many other similarly constructed marine sponges, which are inhabitants of the seas of the western and northern coasts of England, and throughout the whole of this fleshy structure siliceous spicula were dispersed in great abundance, as represented in fig 2 Plate III

In Spongilla and in the marine sponges of Dr Fleming's genus *Halichondria*, the spicula are united systematically into bundles so as to form a framework or skeleton, upon which the softer parts of the animal are supported, but in this Australian species they do not appear to assume any definite arrangement, but are dispersed in all directions through the substance of this cellular or fleshy part of the animal The spicula are transparent and hollow, like those of *Halichondria*, but vary extremely both in size and form Some of them terminate by a regular bifurcation, fig 3 Plate III, and thus assume the character of the triradiate calcareous spicula of Dr Fleming's genus *Grantia*, while in others the bifurcated terminations recurve and assume the form of an anchor with short flukes, without palms, as represented in fig 4 Plate III, others assume very much the appearance of the prevailing form of spiculum that is to be seen in many species of *Hali-*

specimens which are mostly small, but in excellent preservation, are attached to half sheets of very ordinary paper, of the foolscap size* (which is now considered too small) and those of each genus covered by a double sheet in the ordinary manner The names are usually written upon the sheet itself, with a mark or abbreviation to indicate the source from which the specimen was derived Thus those from the Upsal garden are marked *H U* those given by Kalm, *K*, those received from Gronovius *Gron* etc The labels are all in the handwriting of Linnæus himself, except a few later ones by the son and occasional notes by Smith, which are readily distinguished, and indeed are usually designated by his initials By far the greater part of the North American plants which are found in the Linnæan herbarium were received from Kalm or raised from seeds collected by him Under the patronage of the Swedish government, this enterprising pupil of Linnæus remained three years in this country travelling throughout New York, New Jersey, Pennsylvania and Lower Canada hence his plants are almost exclusively those of the Northern States†

Governor Colden, to whom Kalm brought letters of introduction from Linnæus, was then well known as a botanist by his correspondence with Peter Collinson and Gronovius, and also by his account of the plants growing around Coldenham New York, which was sent to the latter who transmitted it to Linnæus for publication in the Acta Upsalensia' At an early period he attempted a direct correspondence with Linnæus, but the ship by which his specimens and notes were sent was plundered by pirates‡ and in a letter sent by Kalm on the return of the latter to Sweden, he informs Linnæus that this traveller had been such an industrious collector, as to leave him little hopes of being himself further useful It is not probable therefore that Linnæus received any plants from Colden nor does his herbarium afford any such indication§ From

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* Upon this subject, Dr Acrel giving an account of the Linnæan collections, thus writes to Smith —' Ut vero vir illustrissimus, dum vixit, nihil ad ostentationem habuit, omnia vero sua in usum accommodata, ita etiam in hoc herbario quod per XL annos sedulo collegit, frustra quæsiveris papyri insignia ornamenta, margines inauratas, et cetera quæ ostentationis gratia in omnibus fere herbariis nunc vulgaria sunt

† Ex his Kalmium, naturæ eximium scrutatorem, itinere suo per Pennsylvaniam, Novum Eboracum, et Canadam regiones Americæ ad septentrionem vergentes, trium annorum decursu dextre confecto, in patriam inde nuper reducem læti recipimus ingentem enim ab istis terris reportavit thesaurum, non conchyliorum solum, insectorum, et amphibiorum, sed herbarum etiam diversi generis ac usus, quas, tam siccas quam vivas, allatis etiam seminibus eorum recentibus et incorruptis, adduxit —*Linn Amœn Acad*, vol iii p 4

‡ Vid Letter of Linnæus to Haller, Sept 21, 1746

§ The *Holosteum succulentum* of Linnæus (*Alsine foliis ellipticis carnosis* of Colden) is however marked in Linnæus's own copy of the 'Species Plantarum' with the sign employed to designate the species he at that time possessed, but no corresponding specimen is to be found in his herbarium This plant has long been a puzzle to American botanists, but it is clear from Colden's description, that Dr Torrey has correctly referred it, in his

Gronovius Linnæus had received a very small number of Clayton's plants, previous to the publication of the 'Species Plantarum,' but most of the species of the Flora Virginica were adopted or referred to other plants on the authority of the descriptions alone.

Linnæus had another American correspondent in Dr John Mitchell*, who lived several years in Virginia where he collected extensively, but the ship in which he returned to England having been taken by pirates, his own collections as well as those of Governor Colden were mostly destroyed. Linnæus however had previously received a few specimens as for instance, those on which *Proserpinaca, Polypremum, Galax* and some other genera, were founded.

There were two other American botanists of this period from whom Linnæus derived, either directly or indirectly much information respecting the plants of this country, viz John Bartram and Dr Alexander Garden of Charleston South Carolina. The former collected seeds and living plants for Peter Collinson during more than twenty years and even at that early day extended his laborious researches from the frontiers of Canada to Southern Florida and to the Mississippi. All his collections were sent to his patron Collinson†, until the death of that amiable and simple hearted man

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'Flora of the Northern and Middle States' (1821), to *Stellaria media*, the common Chickweed. Governor Colden's daughter seems fully to have deserved the praise which Collinson, Ellis and others have bestowed upon her. The latter in a letter to Linnæus (April 1758), says "Mr Colden of New York has sent Dr Fothergill a new plant, described by his daughter. It is called *Fibraurea*, gold thread. It is a small creeping plant, growing on bogs, the roots are used in a decoction by the country people for sore mouths and sore throats. The root and leaves are very bitter, etc. I shall send you the characters as near as I can translate them. Then follows Miss Colden's detailed generic character, prepared in a manner which would not be discreditable to a botanist of the present day. It is a pity that Linnæus did not adopt the genus with Miss Colden's name, which is better than Salisbury's *Coptis*. "This young lady merits your esteem, and does honour to your system. She has drawn and described 100 plants in your method; she uses only English terms. Her father has a plant called after him *Coldenia*, suppose you should call this (alluding to a new genus of which he added the characters) *Coldenella*, or any other name that might distinguish her among your genera."—*Ellis, Letter to Linnæus l c*

* To him the pretty *Mitchella repens* was dedicated. Dr Mitchell had sent to Collinson, perhaps as early as in the year 1710, a paper in which thirty new genera of Virginian plants were proposed. This Collinson sent to Trew at Nuremberg, who published it in the 'Ephemerides Acad Naturæ Curiosorum' for 1748, but in the mean time most of the genera had been already published, with other names, by Linnæus or Gronovius. Among Mitchell's new genera was one which he called *Chamædaphne*; this Linnæus referred to *Lonicera*, but the elder (Bernard) Jussieu, in a letter dated Feb 19, 1751, having shown him that it was very distinct both from *Lonicera* and *Linnæa*, and in fact belonged to a different natural order, he afterwards named it *Mitchella*.

† Mr Collinson kept up a correspondence with all the lovers of plants in this country, among whom were Governor Colden, Bartram, Mitchell, Clayton, and Dr Garden, by whose means he procured the introduction of

their intrinsic value since they are seldom large, and the specimens often imperfect

With the introduction of the Linnæan nomenclature a rule absolutely essential to the perpetuation of its advantages was also established, viz that the name under which a genus or species is first published shall be retained, except in certain cases of obvious and paramount necessity An accurate determination of the Linnæan species is therefore of the first importance and this in numerous instances is only to be attained with certainty by the inspection of the herbaria of Linnæus and those authors upon whose descriptive phrases or figures he established many of his species Our brief notices will therefore naturally commence with the herbarium of the immortal Linnæus, the father of that system of nomenclature to which botany, no less than natural history in general, is so greatly indebted

This collection, it is well known, after the death of the younger Linnæus found its way to England from whence it is not probable that it will ever be removed The late Sir James Edward Smith then a young medical student and a botanist of much promise was one morning informed by Sir Joseph Banks, that the heirs of the younger Linnæus had just offered him the herbarium, with the other collections and library of the father for the sum of 1000 guineas Sir Joseph Banks not being disposed to make the purchase recommended it to Mr Smith the latter, it appears immediately decided to risk the expectation of a moderate independence, and to secure, if possible these treasures for himself and his country, and before the day closed had actually written to Upsal desiring a full catalogue of the collection and offering to become the purchaser at the price fixed, in case it answered his expectations* His success, as

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* The next day Mr Smith wrote as follows to his father, informing him of the step he had taken and entreating his assistance —

" Honoured Sir You may have heard that the young Linnæus is lately dead his father's collections and library, and his own, are now to be sold, the whole consists of an immense hortus siccus, with duplicates, insects, shells, corals, materia medica, fossils, a very fine library, all the unpublished manuscripts, in short, everything they were possessed of relating to natural history and physic the whole has just been offered to Sir Joseph Banks for 1000 guineas, and he has declined buying it The offer was made to him by my friend Dr Engelhart, at the desire of a Dr Acrel of Upsal, who has charge of the collection Now, I am so ambitious as to wish to possess this treasure, with a view to settle as a physician in London, and read lectures on natural history Sir Joseph Banks, and all my friends to whom I have entrusted my intention, approve of it highly I have written to Dr Acrel, to whom Dr Engelhart has recommended me, for particulars and the *refusal* telling him if it was what I expected, I would give him a very good price for it I hope, my dear sir, you and my good mother will look on this scheme in as favourable a light as my friends here do There is no time to be lost, for the affair is now talked of in all companies, and a number of people wish to be purchasers The Empress of Russia is said to have thoughts of it The manuscripts, letters, &c must be invaluable, and there is, no doubt a complete collection of all the inaugural dissertations which have been published at Upsal, a small part of which has been republished under the title of 'Amœnitates Academicæ, a very celebrated and scarce work All these dissertations were written by Linnæus, and must soon appeared, was entirely owing to his promptitude for other and very pressing applications were almost immediately made for the collection, but the upright Dr Acrel having given Mr Smith the refusal declined to entertain any other proposals while this negotiation was pending. The purchase was finally made for 900 guineas, excluding the separate herbarium of the younger Linnæus collected before his father's death and said to contain nothing that did not also exist in the original herbarium this was assigned to Baron Alstrœmer, in satisfaction of a small debt. The ship which conveyed these treasures to London had scarcely sailed when the king of Sweden, who had been absent in France returned home and despatched, it is said, an armed vessel in pursuit. This story though mentioned in the Memoir and Correspondence of Sir J E Smith and generally received, has we believe been recently controverted. However this may be no doubt the king and the men of science in Sweden were greatly offended as indeed they had reason to be at the conduct of the executors in allowing these collections to leave the country, but the disgrace should perhaps more justly fall upon the Swedish government* itself and the University of Upsal which derived its reputation almost entirely from the name of Linnæus. It was however fortunate for science that they were transferred from such a remote situation to the commercial metropolis of the world, where they are certainly more generally accessible. The late Professor Schultes, in a very amusing journal of a botanical visit to England in the year 1824 laments indeed that they have fallen to the lot of the *toto disjunctos orbe Britannos* ' yet a journey even from Landshut to London may perhaps be more readily performed than to Upsal.

After the death of Sir James Edward Smith the herbarium and other collections and library of Linnæus, as well as his own were purchased by the Linnæan Society. The herbarium still occupies the cases which contained it at Upsal, and is scrupulously preserved in its original state except that for more effectual protection from the black and penetrating dust of London, it is divided into parcels of convenient size which are closely wrapped in covers of strong paper lined with muslin. The genera and covers are numbered to correspond with a complete manuscript catalogue, and the collection, which is by no means large in comparison with modern herbaria may be consulted with great facility.

In the negotiation with Smith, Dr Acrel stated the number of species at 8000, which probably is not too low an estimate. The

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be of prodigious value. In short, the more I think of this affair the more sanguine I am, and earnestly hope for your concurrence. I wish I could have one half hour's conversation with you, but that is impossible.—*Correspondence of Sir James Edward Smith, edited by Lady Smith*, vol i p 93

The appeal to his father was not in vain, and did our limits allow, we should be glad to copy, from the work above cited, the entire correspondence upon this subject.

[* Equal disgrace attaches to the British Government, which on the death of Sir J E Smith refused to contribute anything towards the purchase of the collection, which might thus have been lost to the country had it not been bought by the Linnæan Society.—Ed] cies are founded on the plants here described, for which this herbarium is alone authentic; for Linnæus, as we have already remarked, possessed very few of Clayton's plants. The collection is nearly complete, but the specimens were not well prepared, and are therefore not always in perfect preservation. A collection of Catesby's plants exists also in the British Museum, but probably the larger portion remains at Oxford. There is besides among the separate collections a small but very interesting parcel selected by the elder Bartram from his collections made in Georgia and Florida almost a century ago, and presented to Queen Charlotte with a letter of touching simplicity. At the time this fasciculus was prepared, nearly all the plants it comprised were undescribed, and many were of entirely new genera; several indeed have only been published very recently, and a few are not yet recorded as natives of North America. Among the latter we may mention *Petiveria alliacea* and *Ximinea Americana*, which last has again recently been collected in the same region. This small parcel contains the *Elliottia* Muhl., *Polypteris* Nutt., *Baldwinia* Nutt., *Macranthera*, Torr., *Glottidium*, *Mayaca*, *Chaptalia*, *Befaria*, *Eriogonum tomentosum*, *Polygonum polygamum*, Vent., *Gardoquia Hookeri*, Benth., *Satureia* (*Pycnothymus*) *rigida*, *Cliftonia*, *Hypericum aureum*, *Galactia Elliottii*, *Krameria lanceolata*, Torr., *Waldsteinia* (*Comaropsis*) *lobata*, Torr. and Gr., the *Dolichos ? multiflorus* Torr. and Gr., the *Chapmannia* Torr. and Gr., *Psoralea Lupinellus*, and others of almost equal interest or rarity, which it is much to be regretted were not long ago made known from Bartram's discoveries.

The herbarium of Sir Joseph Banks, now in the British Museum, is probably the oldest one prepared in the manner commonly adopted in England, of which, therefore, it may serve as a specimen. The plants are glued fast to half sheets of very thick and firm white paper of excellent quality (similar to that employed for merchants' ledgers, etc.) all carefully cut to the same size, which is usually 16½ inches by 10¼, and the name of the species is written on the lower right hand corner. All the species of a genus, if they be few in number, or any convenient subdivision of a larger genus, are enclosed in a whole sheet of the same quality, and labelled at the lower left-hand corner. These parcels, properly arranged, are preserved in cases or closets with folding doors made to shut as closely as possible, being laid horizontally into compartments just wide enough to receive them, and of any convenient depth. In the Banksian herbarium, the shelves are also made to draw out like a case of drawers. This method is unrivalled for elegance, and the facility with which the specimens may be found and inspected, which to a working botanist with a large collection is a matter of the greatest consequence. The only objection is the expense, which becomes very considerable when paper worth at least ten dollars per ream is employed for the purpose, which is the case with the principal herbaria in England; but a cheaper paper, if it be only sufficiently thick and firm, will answer nearly as well. The Banksian herbarium contains authentic specimens of nearly all the plants of Aiton's 'Hortus Kewensis,' in which many North American species were early established. It is hardly proper, indeed, that either the elder or younger Aiton should be quoted for these species, since the first edition was prepared by Solander and the second revised by Dryander as to vols. i. and ii. and the remainder by Mr. Brown. Many American plants from the Physic Garden at Chelsea, named by Miller, are here preserved, as also from the gardens of Collinson, Dr. Fothergill (who was Bartram's correspondent after Collinson's death), Dr. Pitcairne, etc. There are likewise many contributions of indigenous plants of the United States from Bartram, Dr. Mitchell, Dr. Garden, Fraser, Marshall, and other early cultivators of botany in this country. The herbarium also comprises many plants from Labrador and Newfoundland, a portion of which were collected by Sir Joseph Banks himself; and in the plants of the northern and arctic regions, it is enriched by the collections of Parry, Ross, and Dr. Richardson. Two sets of the plants collected by the venerable Menzies in Vancouver's voyage are preserved at the British Museum, the one incorporated with the Banksian herbarium, the other forming a separate collection. Those of this country are from the north-west coast, the mouth of the Oregon river, and from California. Many of Pursh's species were described from specimens preserved in this herbarium, especially the Oregon plants of Menzies, and those of Bartram and others from the more southern United States, which Pursh had never visited, although he often adds the mark *v. v.* (*vidi vivam*) to species which are only to be met with south of Virginia.

The herbarium of Walter still remains in the possession of the Fraser family, and in the same condition as when consulted by Pursh. It is a small collection, occupying a single large volume. The specimens, which are commonly mere fragments, often serve to identify the species of the Flora Caroliniana, although they are not always labelled in accordance with that work.

The collections of Pursh, which served as the basis of his 'Flora Americæ Septentrionalis,' are in the possession of Mr. Lambert, and form a part of his immense herbarium. These, with a few specimens brought by Lewis and Clark from Oregon and the Rocky Mountains, a set of Nuttall's collections on the Missouri, and also of Bradbury's, so far as they are extant, with a small number from Fraser, Lyon, etc., compose the most important portion of this herbarium, so far as North American botany is concerned. There is also a small Canadian collection, made by Pursh subsequently to the publication of his Flora, a considerable number of Menzies's plants, and other minor contributions. To the general botanist, probably the fine herbarium of Pallas, and the splendid collection of Ruiz and Pavon (both acquired by Mr. Lambert at a great expense), are of the highest interest; and they are by no means unimportant in their relations to North American botany, since the former comprises several species from the north-west coast and numerous allied Siberian forms; while our Californian plants require, in some instances, to be compared with the Chilian and Peruvian plants of the latter.

[To be continued.]

in 1768, and by him many seeds, living plants and interesting observations were communicated to Linnæus, but few if any, dried specimens. Dr Garden, who was a native of Scotland, resided at Charleston, South Carolina, from about 1745 to the commencement of the American Revolution, devoting all the time he could redeem from an extensive medical practice to the zealous pursuit of botany and zoology. His chief correspondent was Ellis at London, but through Ellis he commenced a correspondence with Linnæus, and to both he sent manuscript descriptions of new plants and animals, with many excellent critical observations. None of his specimens addressed to the latter reached their destination, the ships by which they were sent having been intercepted by French cruisers; and Linnæus complained that he was often unable to make out many of Dr Garden's genera for want of the plants themselves. Ellis was

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great numbers of North American plants into the English gardens. "Your system," he writes to Linnæus, "I can tell you obtains much in America. Mr Clayton, and Dr Colden at Albany, on Hudson's River, in New York, are complete professors, as is Dr Mitchell at Urbana, on Rappahannock River, in Virginia. It is he that has made many and great discoveries in the vegetable world." "I am glad you have the correspondence of Dr Colden and Mr Bartram. They are both very indefatigable ingenious men. Your system is much admired in North America." Again: "I have but lately heard from Mr Colden. He is well, but what is marvellous, his daughter is perhaps the first lady that has so perfectly studied your system. She deserves to be celebrated." "In the second volume of Edinburgh Essays is published a Latin botanic dissertation by Miss Colden, perhaps the only lady that makes profession of the Linnæan system, of which you may be proud." From all this, botany appears to have flourished in the North American colonies. But Dr Garden, about this time, writes thus to his friend Ellis: "Ever since I have been in Carolina, I have never been able to set my eye upon one who had barely a regard for botany. Indeed I have often wondered how there should be one place abounding with so many marks of the divine wisdom and power, and not one rational eye to contemplate them; or that there should be a country abounding with almost every sort of plant, and almost every species of the animal kind, and yet that it should not have pleased God to raise up one botanist. Strange indeed that this creature should be so rare!" But to return to Collinson, the most amusing portion of whose correspondence consists of his letters to Linnæus shortly after the publication of the 'Species Plantarum,' in which (with all kindness and sincerity) he reproves the great Swedish naturalist for his innovations, employing the same arguments which a strenuous *Linnæan* might be supposed to advance against a botanist of these latter days. "I have had the pleasure," Collinson writes, "of reading your 'Species Plantarum,' a very useful and laborious work. But, my dear friend, we that admire you are much concerned that you should perplex the delightful science of botany with changing names that have been well received, and adding new names quite unknown to us. Thus botany, which was a pleasant study, and attainable by most men, is now become, by alterations and new names, the study of a man's life, and none now but real professors can pretend to attain it. As I love you, I tell you our sentiments."—*Letter of April* 20, 1754. "You have begun by your 'Species Plantarum', but if you will be for ever making new names, and altering old and good ones, for such hard names that convey no idea of the plant, it will be impossible to attain to a perfect knowledge in the science of botany."—*Letter of April 10th*, 1755, *from Smith's Selection of the Correspondence of Linnæus, &c*.

sometimes more fortunate but as he seems usually to have contented himself with the transmission of descriptions alone, we find no authentic specimens from Garden in the Linnæan herbarium

We have now probably mentioned all the North American correspondents of Linnæus for Dr Kuhn who appears only to have brought him living specimens of the plant which bears his name, and Catesby, who shortly before his death sent a few living plants which his friend Lawson had collected in Carolina, can scarcely be reckoned among the number*

The Linnæan Society also possesses the proper herbarium of its founder and first president, Sir James E Smith which is a beautiful collection, and in excellent preservation The specimens are attached to fine and strong paper, after the method now common in England In North American botany the chief contributors are Menzies for the plants of California and the north-west coast and Muhlenberg Bigelow Torrey and Boott for those of the United States Here also we find the cryptogamic collections of Acharius, containing the authentic specimens described in his works on the Lichens and the magnificent East Indian herbarium of Wallich, presented some years since by the East India Company

The collections preserved at the British Museum are scarcely inferior in importance to the Linnæan herbarium itself in aiding the determination of the species of Linnæus and other early authors Here we meet with the authentic herbarium of the 'Hortus Cliffortianus, one of the earliest works of Linnæus which comprises some plants that are not to be found in his own proper herbarium Here also is the herbarium of Plukenet, which consists of a great number of small specimens crowded, without apparent order, upon the pages of a dozen large folio volumes With due attention the originals of many figures in the Almagestum and 'Amaltheum Botanicum, &c may be recognized, and many Linnæan species thereby authenticated The herbarium of Sloane, also, is not without interest to the North American botanist since many plants described in the 'Voyage to Jamaica, &c , and the Catalogue of the Plants of Jamaica were united by Linnæus in almost every instance incorrectly, with species peculiar to the United States and Canada But still more important is the herbarium of Clayton, from whose notes and specimens Gronovius edited the 'Flora Virginica† ' Many Linnæan spe

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* In a letter to Haller, dated Leyden, Jan 23, 1738, Linnæus writes "You would scarcely believe how many of the vegetable productions of Virginia are the same as our European ones There are Alps in the country of New York, for the snow remains all summer long on the mountains there I am now giving instructions to a medical student here, who is a native of that country, and will return thither in the course of a year, that he may visit those mountains, and let me know whether the same alpine plants are found there as in Europe Who can this American student have been ? Kuhn did not visit Linnæus until more than fifteen years after the date of this letter

† 'Flora Virginica, exhibens plantas quas J Clayton in Virginia collegit Lugd Bat 8vo, 1743 —Ed 2 4to, 1762 The first edition is cited in the 'Species Plantarum of Linnæus , the second, again, quotes the specific phrases of Linnæus

four plates in which the genera are illustrated by magnified figures of the terminal segments of the abdomen with the anal appendages

The zeal with which M De Selys has prosecuted his studies, by inspecting the collections of France and England as well as by his researches in Germany Switzerland and Italy leads us to hope that he may be induced to extend his labours to the fine exotic species of this family, which are very numerous (being distributed over every portion of the globe) and offer an almost untrodden field of investigation

In perusing the memoir, two or three things presented themselves connected with the works of British authors and although not very important, it will be as well to rectify them othewise they may lead to incorrect impressions

P 56 *Libellula rubicunda* is not noticed by Mr Stephens, indeed this Linnæan species was not known in England until Mr Curtis described and figured it in his British Entomology

P 69 It was Mr Dale who *first* discovered *Cordulia Curtisii* and his friend Mr Curtis subsequently captured it Mr Stephens never saw it alive but is indebted to Mr Dale for his specimens

P 84 Mr Stephens took only *one* specimen of *Gomphus pulchellus*, which was most probably transported from the opposite coast

P 108 Dr Shaw published a figure and description of *Æ varia* in 1806

P 114 *Æ rufescens* is exceedingly rare in England, and was *first* discovered by Mr Dale after whom Dr Leach named it, but unfortunately neglected to publish his description

P 160 Mr Stephens published a description of *A xanthopterum* in his 'Illustrations' in 1836, which Mr Curtis seems to have overlooked when he described it in the 16th volume of 'British Entomology under the name of *Agrion rubella*

It is with pleasure we notice the honourable and gentlemanly feeling which has guided M De Selys through his labours instead of being influenced by a narrow and pernicious principle of superseding the names by which species are already known, he has endeavoured to do justice to his predecessors by adopting names according to their right of priority, an honest example which we hope, for the welfare of science, to see followed by all our other continental neighbours

PROCEEDINGS OF LEARNED SOCIETIES

ENTOMOLOGICAL SOCIETY.

May 4th, 1840 —The Rev F W Hope, President, in the Chair

Mr Yarrell exhibited some *larvæ* of *Tipula oleracea*, which had proved very destructive to the grass in Golden Square London Mr Hope stated that lime-water, as well as water from the gas manufactories, was very beneficial in destroying them

Mr Newport exhibited the specimen of *Geophilus* mentioned by him at the last meeting and which was nearly two inches long The same gentleman exhibited a specimen of the pupa of *Sphinx Ligustri* the head case of which he had repeatedly disturbed during its change from the larva to the pupa state and in consequence of which as it appeared to him the tongue case was not developed so that the pupa resembled that of a *Smerinthus* instead of *Sphinx*

Mr Hope exhibited a new species of *Phyllium* from the Neilgherries which he proposed to name *P Robertsonii* after Mr Robertson who had presented a large collection of insects from that country to the Society at the last meeting

Mr Shuckard having read some extracts from his memoir on the family *Dorylidæ*, since published in the Annals of Natural History Mr W W Saunders stated that one of his specimens of *Dorylus orientalis* had been captured in the sunshine but that the other had entered a lighted room in the evening Mr Westwood also objected to several of the views entertained by Mr Shuckard (See his Memoir on *Typhlopone* since published in the Annals of Natural History)

Mr Westwood also read some Notes on African Entomology ' amongst which the almost complete absence of *Homopterous* insects on that continent and the general uniformity of the insects throughout the entire continent and the resemblance of many of them to Indian forms were especially dwelt upon The Rev F W Hope also entered into a detail of the reasons which had induced him to reject the plans which had been proposed for the geographical distribution of insects, and to consider the subject as primarily divisible according to the respective hemispheres He however considered that the northern parts of America and of the old world formed but one entomo-geographical region which he would call Boreal The other parts of each hemisphere exhibit a secondary division The entomology of Africa was well characterized by its uniform character although that of North Africa resembled that of South Europe and that of South East Africa that of Asia Mr Waterhouse also made a variety of observations on the same subject, considering the two hemispheres as primarily distinct

June 1st —The Rev W Kirby, M A , F.R S , Honorary President, in the Chair

Mr Samuel Stevens exhibited a new British genus of *Carabideous Coleoptera* allied to *Pterostichus*, captured by Mr Leplastrier near Dover

Mr Ingpen, A L S , exhibited a mass of minute cylindrical cocoons arranged close together like a piece of honey comb in miniature, being formed by a small species of *Ichneumonidæ* (*Hemiteles* —?), the upper end of many of which had an aperture, whilst in others the aperture was at the opposite end They were found on the surface of the ground in his garden at Chelsea

The Rev F W Hope exhibited several new and rare *Coleoptera* and *Diptera* from New Holland

Mr W Saunders exhibited the larva of a species of *Oiketicus* from the East Indies

BIBLIOGRAPHICAL NOTICES

Monographie des Libellulidees d'Europe Par Edm De Selys Longchamps Membre de plusieurs Societes savantes

We do not know a more noble tribe of Insects than the Dragonflies—the wonderful œconomy perfect organization, exquisite structure beautiful colouring and unusual magnitude of these Insect-hawks combine to render them worthy the attention of the philosopher as well as of the naturalist In the earlier stages of their existence they live as larvæ and nymphæ entirely in the water, where they are actively engaged in entrapping other insects to satisfy their cruel appetites possessing contrary to the greater portion of this class of animals the power of locomotion in their pupa state and being furnished with a remarkable mask which is projected at will to seize their victim When they emerge from their aquatic habitation and assume the perfect state, to soar along the banks, or skim over the surface of a stream in search of insect prey, the evolutions of the larger species are very remarkable they dart forward halt or wheel with the most perfect precision whether it be in sportive play or in the pursuit of other insects, which they capture and devour in their flight, not sparing their kindred species of equal size

On examining living specimens of the larger kinds the volume of their compound eyes will be found to exceed that of any other insect, and the beauty and perfection of these organs is scarcely to be equalled their powers of vision must be wonderful for they can no doubt take in the whole surrounding field of vision at once and in all probability to a very great distance their exquisite wings rival the most beautiful lace work and their bodies are generally painted with Nature's liveliest colours which unfortunately fade after death, otherwise nothing could be more beautiful than a collection of Libellulidæ arranged in a cabinet this misfortune is however in a measure mitigated by emptying and stuffing the thorax and bodies as soon as they are killed Their enormous mouths and powerful organs of manducation are well adapted to their predatory habits and such is their ferocity that when under restraint they have been known to satisfy their inordinate appetites by devouring their own bodies! From some unknown causes, the Dragon flies, like various other insects, occasionally increase to excess when they migrate in clouds like the Locust travelling hundreds of miles in search of food their route being guided by the nearest stream and following the current they pursue their course in countless myriads

Greatly as naturalists and scientific men are indebted to DeGeer and Roesel for their valuable researches relating to these insects volumes might still be written in the investigation of their œconomy without entering upon their specific distinctions, it is not therefore surprising that so interesting a subject should have engaged the attention of many authors who have lately undertaken to characterize the genera and identify the species It is to be regretted that the value of such labours is not duly appreciated in this country, yet it is an incontrovertible fact, that until differences are accurately defined we cannot record even facts with certainty, and unless we submit to a careful investigation at least of the external anatomy, the greatest errors may be committed But until Natural History is considered worthy to form a class in our schools, it is to be feared that little attention will be paid to Entomology, although it is one of the most important branches of Zoology

Amongst the authors alluded to is Vander Linden, who in 1825 published at Brussels his 'Monographia Libellulinarum Europæarum Specimen which, although a limited production was very acceptable, in the same year the Horæ Entomologicæ' of Toussaint de Charpentier put us in possession of a more extensive Monograph of the Libellulidæ of Europe, with a 4to plate exhibiting specific characters from the structure of the anal appendages, and this led to the production of the best work that has yet appeared upon the family, the 'Monographie des Libellulidees d Europe' par M De Selys Longchamps which was preceded in 1837 by a 'Tableau des Libellulines de la Belgique,' containing a systematic list of the species with their localities, and the characters of two new ones, *Petalura flavipes* and *Agrion aurantiaca*

The 'Monograph exhibits a general view of the external anatomy of the Dragon flies in order to refer correctly to the relative position of the various members, but one of the most useful parts is the series of Synoptic Tables the first gives the genera comprising *Libellula Libella Cordulia Lindenia, Gomphus, Cordulegaster Æschna, Anax Calepteryx, Lestes Sympecma* and *Agrion,* of which the three following are not generally known

LIBELLA, *De Selys,* distinguished from *Cordulia* by the anal border of the inferior wings being rounded in *both* sexes

LINDENIA *De Haan,* is characterized by an elevated tubercle before the eyes, which are globose, whereas in *Gomphus* the space is flat and the eyes compressed

SYMPECMA, *Charp*, is separated from *Lestes* by its wings being elevated in repose, and from *Agrion* by its elongated parastigma

There are also three synoptic tables exhibiting the essential characters of all the species, amounting to 61, of which there are likewise more ample descriptions, with the synonyms, localities, etc

The dimensions of all the species of the Libellulidæ in a tabular form is also a novel feature, and adds to the facility of identifying a form, as this family varies less in the size of the sexes and of individuals of the same species than most others

A disquisition follows upon the discoidal triangular cells in the wings, which vary in the different groups, they were first noticed by M Vander Hoeven, and this section embraces some exotic genera

The 'Conspectus Specierum,' in which Charpentier's genus *Platycnemis* is characterized, to receive the species *platypoda,* is drawn up with great care, and completes M De Selys's work, and there are

Mr Frederick Smith exhibited the sexes of six species of *Andrena* which he had observed *in copulâ*, thus proving the specific identity of the different sexes in these species of this troublesome genus, amongst them was *Andrena fulva*, which was proved to be the female of *Andrena armata*, and *A Clerckella*

Mr Westwood exhibited a specimen of *Myrmecocystus mexicanus*, Wesm , a species of ant, some of the neuters of which are of the ordinary form whilst in others the abdomen is immensely swollen and globular these latter individuals are described as never quitting the nest and as making a kind of honey He also observed upon the different kinds or degrees of development noticed among *Hymenopterous* insects, especially the several kinds of neuters of the hive-bees called by Huber &c black-bees nurser bees, wax-workers &c Messrs Waterhouse and Newport doubted however whether there were any real distinctions between these kinds of individuals, as they had never been able to discover any specimens according with such descriptions Mr Shuckard also stated his opinion that there was never more than one kind of neuter among the ants Mr F Smith on the contrary stated that he had constantly found two kinds of neuters in the nest of the *Formica sanguinea*

The following memoir was read

Description of a subgenus of Coleopterous insects closely allied to Carabus By G R Waterhouse Esq

The insect here described agrees in the majority of its characters with *Carabus*, but differs in having the thorax smooth and convex, without reflected margins, and *foveæ* at the posterior angles, the antennæ incrassated in the middle, with the 3rd joint long, the head large and nearly as broad as the thorax, the elytra depressed and the legs long, although destitute of the velvet-like soles to the fore tarsi which distinguish the male *Carabi*, the anterior tarsi are not dilated The name proposed for this insect is

Aplothorax Burchellii, W *Niger, thorace cordiformi antice et posticè truncato angulisque anticis et posticis rotundatis, suprà lævi et convexo, elytris punctato striatis, striis punctisque crebris at non profundis, inter strias 3 et 4 et 7 et 8 punctis majoribus cum illis striis confluentibus* Long corp lin 15½ Inhabits St Helena W Burchell, Esq In Mus D Hope

July 6th —The Rev F W Hope, President, in the Chair

The President exhibited part of a splendid collection of *Coleoptera* received by him from Mexico

Mr. Westwood exhibited portions of the branches of an apple tree bored into by the larva of *Zeuzera Æsculi*, communicated by Dr Lindley

Mr Raddon exhibited a beautiful *Lamia* from the Gold Coast of Africa, as well as a species of *Noctua* and *Cerura* which he had obtained from Mr Bradford, of Bewdley, and which he believed to be new to the British lists of insects He also stated that *Lamia textor* had recently been taken at Walham Green

Mr Marshall stated that Mr Doubleday had informed him that

Sesia Bombyliiformis on emerging from the pupa has the transparent part of the wings entirely clothed with scales

A paper was read by Mr Westwood consisting of suggestions for making collections of insects abroad, especially with reference to their physiological and economical peculiarities which led to an extended discussion, in which Messrs Hope Waterhouse, Marshall Raddon, and others, took part, and by whom the following suggestions were made

In packing insects captured abroad, where there might not be convenience for pinning them it is preferable to use thin layers of linen rag instead of cotton wool, the latter catching the ungues of the insects, and requiring very great care in unpacking Sand in bottles is also objectionable, for if the bottles were not quite full or any holes were accidentally made in the cork whereby the sand partially escaped, the remainder by shaking about would damage the insects Moss or bits of paper were also a good substitute for cotton wool Camphor or pepper as its substitute, should be placed in the bottles or boxes of dried insects Such hard insects as beetles &c , should be killed by being placed in a bottle and immersed in boiling water, which preserves their colours much better than by placing them in spirits The leaves of laurel, or some other plant of the same nature, when bruised and placed in a box of insects would also immediately kill them, but this process hardened the muscles *Lepidopterous* insects may safely be preserved by folding their wings together with the antennæ turned back between them, and then lapped up in a piece of paper folded flat in the shape of a triangle Considerable collections had been received in this manner The spines of the *Acacia* were a good substitute for pins Tin canisters should be used instead of wooden boxes where practicable, in order to prevent the attacks of the white ants and cock roaches when filled the tops should be resined down Soda water bottles were found to be of a much more commodious form than square spirit bottles Rum and arrack, on account of their saccharine qualities, ought not to be used It was also better to place layers of tow between the insects in spirits, and to put but few of the latter together as when much shaken they easily broke to pieces

August 3rd —The Rev F W Hope, President, in the Chair

The President exhibited various new exotic *Coleoptera*, including a new species of *Trochoideus* and one of *Chiasognathus*, both from New Granada

Mr A White exhibited several interesting insects from S^ta^ Fe de Bogota, including new species of *Labidus*, *Pelecinus*, &c

Mr Westwood stated that he had recently observed a great number of the empty cocoons of the small garden ant sticking upon the leaves of a nectarine tree trained against a wall, at a considerable height from the ground, there being nests of the same species at the foot of the wall

The following memoirs were read —

Observations on the genus *Typhlopone*, and descriptions of several other genera of ants By J O Westwood, F L S , since published in the Annals of Natural History

On a new species of *Dynastes* and other *Coleoptera* By the Rev F W Hope

Dynastes Jupiter H *Scutellatus, thoracis cornu medio maximo et incurvo subtus barbato, cornubus duobus lateralibus thoracis longitudine, rectis , thoracis dorso in cornu longissimo absque dente in medio producto cornu capitis porrecto recurvo dimidio antico supra multidentato* Long corp unc 4 lin 10 Inhabits New Granada Allied to *D Neptunus* Sch

Hexaphyllum Westwoodii, H *Nigrum, antennarum clava brunnea thorace profunde rugoso-sulcato, elytris carinatis interstitiis reticulatis* Long corp lin 6⅓ Inhabits New Granada

Pelidnota Victorina H *Flavo-viridis, thorace fusco aurantio, suturâ scutelloque concoloribus elytris pallide viridibus maculis fusco aurantiis aspersis corpore subtùs saturatiore, sterno trochanteribus geniculis tarsisque nigro bronzeis* Long corp lin 10 Inhabits Mexico

Pelidnota Adelaida, H *Viridis, scutello aurato nitido, elytris fusco-bronzeis, lineis viridi-auratis alternantibus, colore bronzeo ochraceo inquinatis* Long corp lin 14 Inhabits Mexico

Pelidnota auripes H *Tota prasina pedibus auratis* Long corp lin 12 Inhabits Mexico

A Letter was read from Alexander Burn, Esq , dated Kaira Gujerat December 6th 1839, addressed to the president of the Entomological Society, accompanying a box containing two Indian species of blister-flies which abound at Gujerat, and which he had found to be equal as vesicants to the Spanish fly indeed when used fresh a *liquor Lyttæ* of greater strength and activity can be obtained from them The writer had called the attention of the Bombay Government to these insects as objects indigenous to India which might be worthy of attention as articles of commerce The first, *Lytta gigas*, Fab appears early in the season of the monsoon (August and September) creeping along the ground seldom using its wings and feeding on the young tender shoots of grasses The other species, *Mylabris pustulata*, Blbg flies about all day and feeds on the flowers of various plants, especially the esculent *Cucurbitaceæ* and *Hibiscus esculentus* and *cannabinus*, abounding in some seasons to such an extent as to prove extremely destructive to the plants hardly a single blossom escaping them To the market gardeners they are therefore a great nuisance, and as the objection to destroy animal life is extremely rank in this part of India the only plan adopted to get rid of them is picking them with the hand from the plants into large earthern vessels, and sending them to a distance of a mile or two to be set free in any wild or uncultivated spot

In reference to the above letter Mr G Newport stated that he had ascertained that *Meloe Proscarabæus*, the common English species, was highly diuretic, and it was suggested that as the two species of

Indian *Cantharidæ* possessed very powerful medicinal properties and were extremely abundant, it would be advisable that they should be collected in quantities and imported into England, so as to supersede the use of the common blister fly

September 7th —Thomas Marshall Esq in the Chair

In addition to the donations of entomological works, a collection of insects from New South Wales was presented to the Society by J S Bowerbank, Esq

Mr Smith exhibited specimens of *Miscus campestris* and *Ammophila vulgaris,* which had been taken *in copulâ* and whence he was led to consider the former only as a variety of the latter species He also exhibited a new British species of *Nomada* and various rare British *Andrenæ*

Mr Walton exhibited three new British species of the *Curculionideous* genus *Magdalis*

October 5th —J Walton Esq, V P in the Chair

Mr Sells exhibited a number of illustrations of the natural history of various species of insects including nests of the *Osmia cærulescens* numerous kinds of galls formed by *Cecidomyiæ* &c with their parasites *Chlorops pumilionis* in various states the larvæ of which had proved very destructive this year near Kingston, and had entirely destroyed several acres of rye

Mr Westwood exhibited a remarkable gall brought from Manilla by Mr Cuming the outer covering of which consisted of exceedingly fine filaments which crumbled to powder on being touched and the inhabitant of which was a species of *Cynips*, also a cocoon made by a large *Saturnia,* the chrysalis of which was still inclosed and filled with eggs although the antennæ-cases were so broad as to lead to the supposition that the specimen was a male

Mr Ingpen exhibited the cocoon of *Cetonia aurata* the larva of which he had then recently found at the root of a tree, containing a living imago, likewise another mass of the cocoons of the *Hemiteles* sp ? found attached to a lilac branch

Mr Smith exhibited various species of British ants of the different sexes, showing the two distinct kinds of neuters of *Formica sanguinea* in the nest of which he had also found *Formica fusca F cunicularia,* and *Myrmica rubra* also a piece of the stump of an oak tree burrowed into in all directions and inhabited by *Formica rufa*

Mr Stephens mentioned a remarkable instance of the occurrence of the autumnal disease of flies, having observed that a great number of the blades of a tall grass (*Sesleria cærulea*) growing at the sides of the path leading through Ongar Park Wood in Essex for about fifty yards were covered with hundreds of dead specimens of *Cheilosia gracilis,* many of which he exhibited still attached to the stems of the grass he also observed one of the flies fly languidly down, settle on the grass, and die

Mr Westwood exhibited drawings of the veins of the wings of various genera of British butterflies, commenting upon the modifica tions to which they are subject, and which he had found to afford a very satisfactory character for determining the limits of several of the genera not only in these insects, but also among the *Homoptera*, in which order they had not hitherto been employed

The commencement of a paper by J O Westwood F L S , entitled ' Observations on the Linnæan species of *Staphylinidæ* was read

In this memoir the author reviews the opinions which have been expressed by the various writers upon this family of beetles relative to the different species of rove-beetles described by Linnæus and also guided by the Linnæan Collection itself in the possession of the Linnæan Society determines the modern genera to which the species respectively belong, and corrects their synonyms The following is an abstract of the latter part of these observations —

Sp 1 *Staphylinus hirtus* is the *Emus hirtus*, Leach

Sp 2 *St murinus* is *Staphylinus* (*Trichoderma*, Steph) *nebulosus* Fabr Steph , &c

Sp 3 *St maxillosus* Under this name Linnæus united *Creophilus maxillosus* K and *Goerius olens* Leach

Sp 4 *St erythropterus* is the *St erythropterus* Fabr (*cæsareus* Cederh and Erichs), not the *St castanopterus*, Grav

Sp 5 *St politus* Several species confounded together, but the typical specimen is the *Staph æneus*, Grav Gyll

Sp 6 *St rufus* is *Oxyporus rufus*, Fabr

Sp 7 *St lunulatus* is *Bolitobius lunulatus* of Panzer and Zetterstedt (*B atricapillus*, Fabr , &c)

Sp 8 *St riparius* is *Pæderus riparius*, Fab

Sp 9 *St obtusus* is a *Tachyporus* specifically identical with *T analis*, Fab , which is a variety of it

Sp 10 *St lignorum* is a *Tachinus* of the size of *T subterraneus*

Sp 11 *St Silphoides* is identical with *Tachinus suturalis*, Grav

Sp 12 *St subterraneus* is *Tachinus subterranneus* Grav

Sp 13 *St flavescens* No specimen of this doubtful species exists in the Linnæan cabinet

Sp 14 *St elongatus* is identical with *Lathrobium elongatum*, Erichs

Sp 15 *St biguttatus* is a small *Stenus*

Sp 16 *St bipustulatus* No specimen of this evident species of *Stenus* exists in the Linnæan cabinet

Sp 17 *St canthariellus* Ditto Probably a *Malthinus*

Sp 18 *St littoreus* is identical with *Oxyporus* (*Conurus*, Steph) *cellaris*, Fab

Sp 19 *St sanguineus* is an *Aleochara* closely allied to *A fuscipes*

Sp 20 *St caraboides* is *Lesteva caraboides*, Grav (*testaceus*, Bdv and Lacord)

Sp 21 *St chrysomelinus* is *Tachyporus chrysomelinus*, Auct

Sp 22 *St flavipes* is *Tachyporus hypnorum*, Fab

Sp 23 *St fuscipes* is identical with *Gyrohypnus lentus*, Grav

Sp 24 *St rufipes* is identical with *Tachinus pullus*, Grav

Sp 25 *St piceus* is *Oxytelus piceus* Gyll

Sp 26 *St boleti* is *Gyrophæna minima* Erichs

November 2nd.—J. Walton, Esq., V.P. in the Chair.

Mr. Westwood gave an account of several recent observations made by him relative to the development of the *Myriapoda*, exhibiting specimens and drawings of some minute individuals of *Lithobius forcipatus* which differed from each other in the number of limbs, one having only eight pairs of feet, another ten, another eleven, whilst one, which was a quarter of an inch long, had gained fifteen pairs. In the former individuals there were several pairs of extremely minute appendages arising at the sides of the rudimental terminal segments of the body; but in the last-mentioned specimen the terminal segment of the long hind pair of feet were fully developed. He also exhibited a full grown *Lithobius*, one of the penultimate legs of which was very short, and which he considered was the result of an arrest of development, and not the reproduction of the limb. He would also explain in the same manner the cause of the minute size of one of the feet of several specimens of *Scolopendra* which had been exhibited at former meetings of the Society, in all which it was one or other of the hind feet which was of a diminished size. He also exhibited a small slender white wingless insect, one sixth of an inch long, captured running on the ground, possessing six feet and two very long anal filaments, thus resembling the larva of a *Staphylinus*, but having multiarticulate antennæ and broad 4-dentate mandibles; the abdominal segments were also furnished at the sides beneath with very minute short filaments. Hence as this insect would not accord with the larva of any known group of insects, he deemed it possible that it might constitute a new genus of *Myriapoda* in an undeveloped state.

The following memoirs were read:—

Notice of a simple method of entrapping and destroying Wasps. By the Rev. F. W. Hope. This plan, which is very serviceable in protecting wall fruit, consists in placing pieces of the fruit or bits of meat under a hand glass raised an inch or two above the ground, having one of the top panes taken out or a small hole made at top, with another hand glass placed on the top of the lower one; the insects being attracted to the food fly upwards into the upper glass and are easily destroyed by introducing a few lighted matches into the upper glass. This plan is mentioned by Mr. Ingpen in his instructions for collecting; and Mr. Marshall stated that he had also known it used for collecting nocturnal *Lepidoptera*, a light being used under the glass to entrap the moths. Mr. Bainbridge also mentioned that by hanging dead birds or pieces of flesh in front of wall-fruit trees the fruit would be left untouched.

The continuation of Mr. Westwood's memoir on the Linnæan *Staphylinidæ* was also read.

December 7th.—The Rev. F. W. Hope, President, in the Chair.

Mr. Evans exhibited a specimen of ***Paussus Burmeisteri***, and a new species of ***Chiron***, which he had recently received from South Africa.

Dr Calvert presented some living larvæ of one of the species of *Noctuidæ* which he had found exceedingly destructive to his wheat crops in the north of Yorkshire, the larvæ ascending the stems and devouring the grain at the end of September The land upon which the crops attacked were sown was reclaimed moor land, and it was considered that it was owing to the lateness of the ripening of the crop that it was subject to these attacks, earlier crops in more southern parts of the country escaping It was further suggested that it would be desirable to plough up the soil several times to a considerable depth whereby the larvæ or chrysalides in the winter or spring would become exposed and would be greedily devoured either by the rooks or by ducks, which might be turned into the fields for that purpose

The following memoirs were read

Observations on the Migrations of certain Butterflies in British Guiana By Robert Schomburgk, Esq Corr Memb E S , &c

In this memoir the author notices that several species of *Callidryas* are often observed in the months of September and October, settling in prodigious numbers on the wet sand banks, and which, when alarmed, presented a brilliant spectacle in the display of the different shades from deep orange to the palest sulphur colours The Indians, when they observed a number hovering over a particular spot said that they were come to celebrate a marriage dance whilst such as were settled with their long spiral tongues unrolled, and resting on the moist sand bank were compared to paiwori drinkers On the morning of the 10th October 1838, while ascending the river Essequibo he observed myriads of these butterflies coming from the south west and flying to the north-east, always crossing the river in that direction, flying over the tops of the forest trees, but descending nearly to the surface of the river when they had to cross it the distance which the boat had travelled during the day was nine miles and the butterflies continued an uninterrupted column from 8 o'clock A M till half past 5 P M so that their numbers must have been incredible It was supposed that they came from the extensive savannahs along the Pacaraima mountains, and were flying toward those which extend between the rivers Berbice and Corentyn The Accawai Indians at the upper river Demerara sometimes collect large numbers of caterpillars, which they use as food indeed their numbers are so great that whole baskets full are gathered, after which they are roasted and mixed with the flour prepared from the root of the cassava (*Jatropha manihot*) and baked into cakes the caterpillars are also sometimes mixed with turtle eggs which constitutes a great delicacy The Accawai Indians in Mr Schomburgk s company asserted that the butterflies there seen deposited their eggs in the plants from which the caterpillars used as food are collected

Mr Gould also stated that he had observed a species of caterpillar in vast profusion in the interior of New South Wales, distinct from the bugong, upon which the natives fed, and which was also devoured by a species of hawk and the ibis

There was also read a memoir by J O Westwood, F L S , consisting of descriptions of the following exotic Hymenopterous insects belonging to the family *Sphegidæ* —

TRIROGMA W *Antennæ* ♂, *ferè corporis longitudine filiformes Caput tuberculo frontali Mandibulæ mediocres dente interno latissimo Labrum minimum Metathorax utrinque angulariter productus Abdomen* 3-*annulatum*, ♂ *Tarsi simplices Ungues bifidi* Dolichuro *affinis*

Trirogma cærulea W *Tota cærulea, punctata, griseo-villosa antennis tibiis tarsisque nigris, alis hyalinis* Expans alar lin $9\frac{1}{2}$ Inhabits Northern India Mus W W Saunders F L S

APHELOTOMA, W *Caput latum, anticè parum productum Mandibulæ crassæ dente interno acuto Thorax anticè et postice valde attenuatus Alæ breves Cellula marginalis* 1 *haud appendiculata*, 4 *submarginales* 1^{ma} *appendiculata Pedes inermes Tarsi simplices* ♀ Ampulici *affinis*

Aphelotoma Tasmanica W *Nigra, pedibus rufis, alis fuscis anticis fasciâ mediâ albâ* Expans alar lin 6 Inhabits Van Diemen s Land D Ewing Mus Westwood

CHLORION (*Latr* AMPULEX *Jur*) cyanipes W *Nigro-cærulea rudè punctata, mesothoracis dorso in medio haud longitudinaliter impresso pedibus cyaneis alis fuscescenti-hyalinis nubilâ subapicali obscuriori* Expans alar lin $5\frac{1}{2}$ Inhabits the Capeo Good Hope Mus Westwood

ZOOLOGICAL SOCIETY

July 14 1840 —William Yarrell Esq , Vice-President, in the Chair

A letter from Sir Robert Heron Bart , dated July 8 1840, was read It related to a young Kangaroo, which had crawled out of the pouch of the parent long before the proper time and was consequently unable to return its body was marked all over by the mother in her attempts to get it back into the pouch In a second letter Sir R Heron states that this young Kangaroo was quite naked, and unable to move It was some hours before he could find the keeper and when he arrived the little animal was scarcely alive The keeper took it home, gave it milk, and by careful treatment it quite revived and was restored to the pouch of the mother, where it has remained for five days appears to be perfectly well, and frequently protrudes its nose The mother never left it, and was evidently under great anxiety

Some specimens, displaying the different stages of the *Rana Paradoxa*, were also exhibited These specimens were brought from Demerara by Capt Warren, who presented them to the Society

Mr Fraser exhibited and pointed out the characters of the following new species of birds from the collection of the Earl of Derby

TURDUS GIGAS *T nigrescenti-olivaceus, subtus fuscescenti-cinereus, hóc colore apud gulam crissumque obscuriore caudâ et capite fuliginosis, gutturis plumis strigâ obscura et oblongâ notatis, rostro pedibusque flavis*

Long tot 14 unc *rostri*, $1\frac{1}{8}$, *alæ*, $6\frac{1}{2}$, *caudæ*, $6\frac{1}{2}$, *tarsi*, $1\frac{1}{2}$
Hab S^ta^ Fé de Bogota

This bird may at once be distinguished from any other American species with which I am acquainted by its much greater size

Psittacus chalcopterus *P nigricans nitore submetallico, plumis capitis cæruleo et nec non viridi lavatis, illis dorsi sub-fuliginosis, tinctura viridi, illis corporis subtus cæruleo suffusis, alarum tectricibus æneo viridibus hic et illic ochreo tinctis, primariis uropygio caudâque intensè cæruleis tectricibus caudæ paululùm virescentibus crisso rubro, plumis femorum gutturisque rubro variegatis, alis subtus virescenti-cæruleis, tectricibus inferioribus intensè cæruleis, rostro flavo*

Long tot $11\frac{1}{2}$ unc, *rostri* 1 *alæ* $8\frac{3}{8}$ *caudæ* $3\frac{1}{2}$, *tarsi*, $\frac{1}{2}$
Hab S^ta^ Fe de Bogota

Very closely approximates to the *Psittacus purpureus*, Gmel, but may at once be distinguished by its beak being entirely yellow, the absence of the red spot in front of the eye its blue rump, the feathers on the legs throat and chest being variegated with red the darker colour of the abdomen, and also in the colouring of the upper and under surfaces of the wings

Picus elegans *P coccineus fasciâ per genas excurrente, et abdomine, flavis, mento guttureque nigro flavidoque variegatis, plumis pectoris et uropygii rubello flavido et nigro fasciatis, caudâ nigrâ, primariis fuscescenti-nigris extus olivaceis*

Fœm *differt gutture, capiteque supernè nigris*

Long tot 12 unc *rostri* $1\frac{1}{2}$, *alæ* $5\frac{3}{4}$ *caudæ*, $4\frac{1}{2}$, *tarsi*, $\frac{7}{8}$
Hab S^ta^ Fe de Bogota

Head, neck, back, wings, and moustache blood-red, a stripe commencing at the nostril passing through the eye and extending on to the ear-coverts together with the abdomen, under surface of the tail and wing coverts yellow, chin black each feather having a narrow bar of yellow which becomes more distinct on the throat and chest which are tinged with red, the feathers of the rump and upper tail coverts are similarly marked with those on the chest, but more obscurely primaries olive tail beak and feet black

The female only differs from the male in having the upper surface of the head and moustache black all the colours are less brilliant

This bird appears nearly related to *Colaptes campestris* (*Picus campestris* Licht)

The three species above described are from the collection of the Earl of Derby

Mr, Fraser also exhibited some specimens of the true *Pteroglossus Azaræ* of Wagler and Vieillot and pointed out the differences between that species and the bird figured by Mr Gould, in his Monograph of the family of Toucans, under that name

' This bird differs from the *Azaræ* of Gould, in having the broad dusky dash along the upper mandible (having seen about twenty specimens of this species of all ages and sexes I can safely say that it is not a sign of immaturity, or caused by decomposition, as Mr Gould was led to suppose, but really a specific difference), the *very* broad black belt, and the *very* narrow band of scarlet across the abdomen as may be seen by a comparison of the figure given by Gould in his Monograph, and the one by Vieillot in his *Galérie des Oiseaux* tom ii

' The specimen now before me, of the *Azaræ* of Wagler was brought from British Guiana by R H Schomburgk, Esq , Corr Memb Zool Soc and presented by him to this Society In the Earl of Derby s collection there is a specimen of the bird figured by Gould, for which I propose the name of *Pteroglossus flavirostris,* from the uniform colouring of its beak M Natterer informs me the latter species is from Rio Janeiro "

July 28 —Professor Owen in the Chair

Mr Cuming exhibited some specimens of Quadrupeds which he had procured during his stay at Malacca , they consisted of two specimens of *Semnopithecus obscurus,* which species, Mr Cuming states, is subject to great variation in its colouring, one specimen of *Felis marmorata,* and one of *Rhizomys Sinensis*

Mr Cuming's notes relating to the last-mentioned animal state that the specimen was a male, and before it was skinned afforded the following dimensions length from the tip of the nose to the root of the tail 15 inches of tail 6 inches girth behind the shoulders 8 inches The animal lives on the roots of bamboos under which it burrows , the eyes are very small, and of a black colour

Mr Blyth read a paper entitled ' An Amended List of the Species of the genus *Ovis** "

The paper was illustrated by numerous drawings , and the horns of the Rass of Pamir, from the Museum of the Royal Asiatic Society, and two pairs of those of the *Shà* of Little Thibet, and one of the Nahoor Sheep, or *Snà* of Great Thibet, brought by G T Vigne Esq , were exhibited

Mr Blyth also exhibited various other coloured drawings and specimens collected chiefly in Little Thibet by Mr Vigne, among the former of which were several figures of the Yak (*Bos grunniens*), a highly-finished portrait of the Jharal† of Mr Hodgson, another of the *Ovis Vignii,* some sketches of the *Ursus isabellinus* (or *Syriacus* of Ehrenberg ?) and of Buffaloes of the same breed as that of Italy and Hungary with the long tail &c , that were drawn from life at Hurriana This race was more esteemed for the quantity of milk it yields than the ordinary Indian Buffalo, with long horns, a shorter tail &c , and is doubtless the same, in the opinion of Mr Blyth, as the Guzurat race indicated in Dr Buchanan's Journey through Mysore, &c which that author, however observed at Seringapatam It appears to be scantily diffused throughout India becoming rarer to the eastward

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* The paper will be given in a future number

† " This animal is mostly known as the *Tehr, Thaar,* or *Thar,* to the westward of Nepal, a name applied by Mr Hodgson to a very different animal, which is usually called *Surow,* or *Surrow* The first of these names as suggested to me by Col H Smith is clearly a modification of the Teuton *Thur,* ramifying into *Thier, Deer,* &c &c &c *Surow,* or *Surrow,* again passes into various other names, applied to different Himalayan Ruminants, as *Jerow* or *Jerrow* for the *Cervus Aristotelis, Serow* and *Chirew* (pronounced with a soft 'Ch') for the *Panthalops chiru,* Hodgson, &c Then we have *Jharal, Goral, Goorul, Baral, Boorul, Burrhel, Boorhoor, Nayoor, Nahoor,* and even the Persian *Maral* may be derived from the same root These names, too, are all severally applied to different animals, whence it often requires much caution in endeavouring to ascertain what species is intended " —E B

Among the specimens was the horn of a Stag from Kashmir which Mr Blyth suspected would prove to be the *C Wallichii* of Duvaucel or a closely allied species a description of which may be expected from Dr Falconer The specimen exhibited was 44 inches long and 8 inches round above burr it had a brow, a bez, and royal antlers the bez a foot in length and longest of the three and it terminated in a bifurcating crown, precisely as in the *Cervus Elaphus* of the Sal forest of Nepal, figured by Mr Hodgson and supposed by Mr Ogilby to be *C Wallichii*, an opinion in which Mr Blyth coincided The general character of this horn was intermediate to that of the *Wapiti* and European Stag, but agreeing more nearly with the latter in its kind of granulated surface

There were also three pairs of horns of the *Markbur* of Kabul or *Rawacki* of Little Thibet, a race of feral common Goats (in the opinion of Mr Blyth) remarkable for their large size and also that of the horns which last are more or less twisted varying from the curvature of those of the Koodoo only in an opposite direction to the tense spiral of the Caffrarian Impoof's horns, as shown by the specimens then exhibited It was remarkable that no tame Goats observed by Mr Vigne in the same countries at all approached this feral race in stature, nor was it known to occur in Persia or in Nepal From the circumstance of the twist alone of the horns of this animal, Mr Blyth argued that it was not an aboriginal species, for whereas an inward spirature or at least a tendency to it at the tips was all but invariably observable throughout the endlessly diversified races of domestic Goats, neither the wild *Capra Ægagrus* nor any other of the numerous distinct species of wild *Capræ* known to Mr Blyth exhibited this spirature in the least degree besides which, it appeared to be alike in no two specimens of the *Markbur* This animal, however, as he was informed did not vary in colour, which resembles that of an ordinary brown domestic Goat A description and figure of it have been published in Mr Vigne's narrative of his travels in Kabul

Finally, were exhibited the skull and horns of a magnificent specimen of the Himalayan Ibex, being the second skull and third pair of horns of this species examined by Mr Blyth, all of which accorded with each other in the several particulars in which they differed from the Swiss Ibex The animal is very closely allied to the latter, having a similar rudimental beard, and colouring so far as he could learn, but the horns are much longer, considerably less divergent (a constant distinction in both species), and resemble those of the Egyptian Ibex in curvature excepting towards the base, they are less massive than the horns of the Swiss Ibex, the middle part being narrower, and the tips which incline more abruptly somewhat forward and inward, are much more attenuated, or drawn out The splendid pair exhibited which were in their twelfth year of growth, and all but fully developed, measured $4\frac{1}{4}$ feet over the curvature, and $10\frac{1}{2}$ inches round at base, diverging to 23 inches asunder measuring outside, at nearly three-fourths of their length from the base and the tips returning to 16 inches apart, at a distance of 20 inches from the base inside They are 4 inches deep at base, $2\frac{1}{4}$ inches broad anteriorly and 2 inches at a foot distance from the base, bearing 26 prominences, and numbering, as before remarked 12 years of growth which successively give 16, 7, 5, 4 5 4 $3\frac{1}{2}$ $2\frac{1}{2}$ 2, $1\frac{1}{2}$ and the last (incomplete) $\frac{1}{2}$, inches The extreme length of skull is 12 inches, or $18\frac{1}{2}$ inches over the curves, from tip of intermaxillary to occipital *foramen* breadth across of orbits posteriorly 7 inches, and total length of bony palate $6\frac{1}{4}$ inches The dimensions of the largest pair of horns of the Swiss Ibex examined by Mr Blyth and which were of the same age as the preceding are given as follows Length $3\frac{1}{2}$ feet over the arch having a span of 2 feet from base to tip inside, the points $2\frac{3}{4}$ feet asunder and basal circumference $10\frac{3}{4}$ inches, number of prominences above 20, several being comprised within the first 8 inches They diverge quite regularly, and somewhat spirally, more outward to the tip

' The Himalayan Ibex ' continues Mr Blyth ' is the *Skyn* or *Skeen Sakeen* or *Sikeen* (as variously written) of different parts of its range, and is numerous, according to Mr Vigne, in Little Thibet, where it is designated *Skyn* In Kashmir it bears the name of *Kyl* Mr Moorcroft informs us that in Ladakh the male is termed *Skyn*, and the female *l Danma*[*] he describes it to inhabit the most inaccessible crags of the mountains, and other authors notice its habits as entirely resembling those of its Alpine congener[†] In Kashmir as I am informed by Mr Vigne, its *poshm* (or under-fleece of delicate silky wool) which in all the true massive horned Ibices is amazingly copious in winter is highly prized, ' that of one large Ibex being equal to the produce of three Shawl Goats, besides being softer and finer I have some beautiful cloth continues that gentleman, ' made from the *poshm* of the Ibex The animal is of a sepia brown colour It may be further noticed, that in the ' Journal of the Asiatic Society of Bengal, vol v p 242, it is stated that Major Kennedy had a pair of these animals, stuffed at Suhatu, in Kunawar A skull and horns which I saw at Mr Leadbeater s was received from Nepal, where however, the species does not yet appear to have been noticed by Mr Hodgson Dr Falconer has probably named it

' *Himalaya Ibex* *Capra* Ibici Helvetico simillima sed cornibus magis prolongatis semper minùs divergentibus, apicibus attenuationibus et ad antrorsùm abruptiori-curvatis,—sic ut in plurimis speciebus hujus generis, at vix in *Caprâ Ibice* vera "

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[*] Travels, i 311

[†] Vide ' Journal of a Trip through Kunawar, published in the ' Journal of the Asiatic Society of Bengal for 1839, p 928

ROYAL BOTANICAL SOCIETY OF EDINBURGH

The Society met on Thursday evening (March 11th) in the Royal Institution Dr Greville in the chair

Mr Edward Forbes read a communication on the specific value of the appendages of the anthers in the genus *Viola*

Mr Forbes commenced by stating, that in some plants a particular form of the leaf or other appendage might be the same in all the species while in other plants this form might only be similar in a few species In the case of the genus *Viola,* the antherine appendages or nectaries have generally been regarded as of generic importance only By comparing the nectary of a Pansey with that of a Dog-violet, a difference will be observed of specific or at least sectional importance In order to ascertain the value of this character he had examined above seventy species of Violets, chiefly from the herbarium of Dr Greville He found three different forms of nectaries The most common is lancet shaped, which prevails among the allies of *Viola canina* and *Viola odorata* The next is of a linear form and prevails chiefly amongst the Pansies *V lutea,* etc The third is rotund, a rare form, but which may be seen in the *Viola palustris* These nectaries are to be found in the spur of the flower which varies in form according to the shape of the nectary When the nectary is lancet-shaped the spur is generally thick in proportion to its length and very blunt being shortest in those species which have the nectaries broadest The rotund nectary is generally associated with a short round spur, and the linear with a slender spur, often of great comparative length The colours of Violets have also some relation to the forms of the nectaries In this genus, blue yellow, purple and white are the colours seen The blue may again be divided into purple blue and sky-blue, each passing into white The purple may also pass into white but the sky-blue never does These distinctions are of importance in the investigation of nearly allied species such as *Viola canina* and *Viola montana* In the one case the yellow passes into pink, and in the other into purple White is rarely the normal colour of a Violet The lancet-shaped nectary is chiefly associated with blue flowers sometimes with the yellow passing into white but never with the yellow passing into purple they having always linear nectaries The Violets which are normally white derived from blue have always lanceolate or rounded appendages Mr Forbes also pointed out the relation of the nectary to the leaf to the bractea or stipula and also to the stem By considering these along with the colour and geographical distribution, he thought a very natural arrangement of this extensive genus might be made, and which would greatly facilitate the distinction of species

The next paper was upon the botanical characters of the British Oaks, by Dr Greville The author stated that he had paid great attention to the distinctive characters of the oaks for the last three years and his investigations had led him to believe that the usual specific distinctions were not correct Thus he found that the *Quercus sessiliflora* in one situation might have a very short flower-stalk, and in another a very long one, and the same was the case with other species, so that the distinction here indicated by the name is incorrect The difference between *Quercus Robur* and *sessiliflora* could not be ascertained by the botanical characters, but it was well known that a great difference existed between the wood of these two species The former was called the white oak and the latter the red, and in some districts the white was considered of double the value of the red as a timber He offered these observations merely to draw the attention of botanists to this genus and to endeavour to find some new characters by which they might be distinguished It was of great value to this country that the best oak should always be planted and he hoped that some characters would be ascertained by which to distinguish them Dr Greville had not examined specimens from any district south of Cumberland and Westmoreland The terms ' red and white oak have been applied evidently by various authors sometimes to one, sometimes to the other, and the redness described by some writers is evidently a disease, not a specific difference in the timber The whole subject requires a careful and strict examination

Communications were also read from Mr George Gardner, dated Rio de Janeiro December 3rd, 1840, with some account of his recent collections in Brazil, and a notice of *Lecanora rubra* (of which specimens were presented) found near Richmond, Yorkshire, by Mr James Ward

Thursday being the night of the anniversary, a large number of the members and their friends sat down to supper in the Hopetoun Rooms, Professor Graham in the chair and Dr Neill acting as croupier for Dr Christison, who was absent from indisposition

WERNERIAN NATURAL HISTORY SOCIETY OF EDINBURGH

At the meeting of this Society held on the 20th ult Professor Traill read a Memoir of the Life and Writings of the Rev George Low, minister of Birsay, in Orkney author of ' Fauna Orcadensis,' and the friend and correspondent of Sir Joseph Banks and Mr Pennant This memoir will appear in the next part of the Society s Transactions

At the same meeting, Mr Goodsir described a new species of *Gymnorhynchus*, and exhibited specimens and drawings of the animal The most interesting circumstance in the history of this Entozoon is the manner in which it is enclosed in a firm cyst although armed with powerful toothed jaws

At the meeting held on the 6th of March, a paper was read by Mr Torrie, on the recent ' Travels in Turkey' of Dr Boue, the geologist, in which a summary was given of the observations and discoveries made by him during the last four years in the geography geology botany and zoology of the more remote portions of that comparatively little-known country

At the same meeting a communication was read by the Secretary from Professor Fleming, of King s College, Aberdeen on a new species of the Ray family or Skate tribe, discovered by him last summer on the coast of Aberdeen, and which he proposes to place under a new generic title by the name of *Cheiroptera abredonensis* Illustrative drawings of the fish were exhibited This skate was taken in July last, and was about eighteen inches in length From the drawings it appeared to belong to the genus *Cephaloptera*, but we hope the Professor will lose no time in publishing a figure and description of this interesting fish

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MISCELLANEOUS

Mr Gray's 'Genera of Birds'—In my review of Mr Gray s work I accidentally omitted to state that the various errors in the orthography of the generic names there pointed out are not attributable to Mr Gray, but to the respective authors from whose works he adopted those names —H E STRICKLAND

Birds of Kent —Our correspondent Mr Stephen Mummery of Bath road, Margate informs us of the capture in a wood near Canterbury of a species of Cuckoo of which he has sent a description, which we must examine more at leisure He is engaged in preparing a list of birds found in Kent arranged under heads, as Residents Periodical Visitants and Stragglers, with their times of arrival and departure, and places where found

METEOROLOGICAL OBSERVATIONS FOR FEB 1841

Chiswick —Feb 1 Snowing 2 Snow showers 3 Frosty dry and cold very severe frost at night 4 Frosty overcast 5 Dry cold haze windy at night 6 Boisterous 7 Boisterous hazy and cold 8—11 Hazy and cold 12 Dense fog very fine rain 13 Overcast rain 14 Rain cloudy 15 Cloudy slight rain 16, 17 Hazy 18 Fine 19 Rain cloudy and fine 20 Cloudy and fine rain 21 Overcast and fine 22 Dense fog 23 Hazy rain 24 Hazy and cold 25 Cloudy and cold rain 26 Rain 27 Cloudy rain 28 Very clear cloudy and fine

Boston —Feb 1 Cloudy snow A M and P M 2 Fine snow early A M snow P M 3 Cloudy snow early A M and P M 4, 5 Cloudy 6, 7 Stormy 8 Cloudy snow P M 9, 10 Cloudy 11—13 Cloudy rain P M 14 Cloudy 15 Cloudy rain P M 16 Cloudy 17 Rain 18, 19 Cloudy 20, 21 Fine 22, 23 Foggy 24 Rain 25 Cloudy rain P M 26 Rain rain P M 27 Rain 28 Fine

Applegarth Manse, Dumfries shire —Feb 1 2 Sprinkling of snow frost P M 3 Snow showers frost 4 Frost fair but cloudy 5 Frost sprinkling of snow 6 Frost occasional snow showers 7 Frost severe and cold 8, 9 Frost cold and withering 10 Frost, but giving way 11 Thaw and heavy rain sleet 12 Fog rain fine thaw 13 Rain all day 14 Rain in the evening mild 15 Rain all day 16, 17 Fair but cloudy 18 Wet all day 19 Clear and cold 20 Fine 21 22 Fine, but cloudy 23 Rain A M moist P M 24 Clear and cold 25 Cloudy and threatening rain 26 Cloudy with high wind 27 Frost in the morning 28 Frost in the morning with snow on the hills

Sun shone out 19 days Rain fell 8 days Frost 11 days Snow 6 days

Wind north 1 day North-east 8 days East north east 2 days East 2 days East-south-east 1 day South-east 4 days South 4 days South-west 2 days West 1 day North-west 1 day North-north-west 2 days

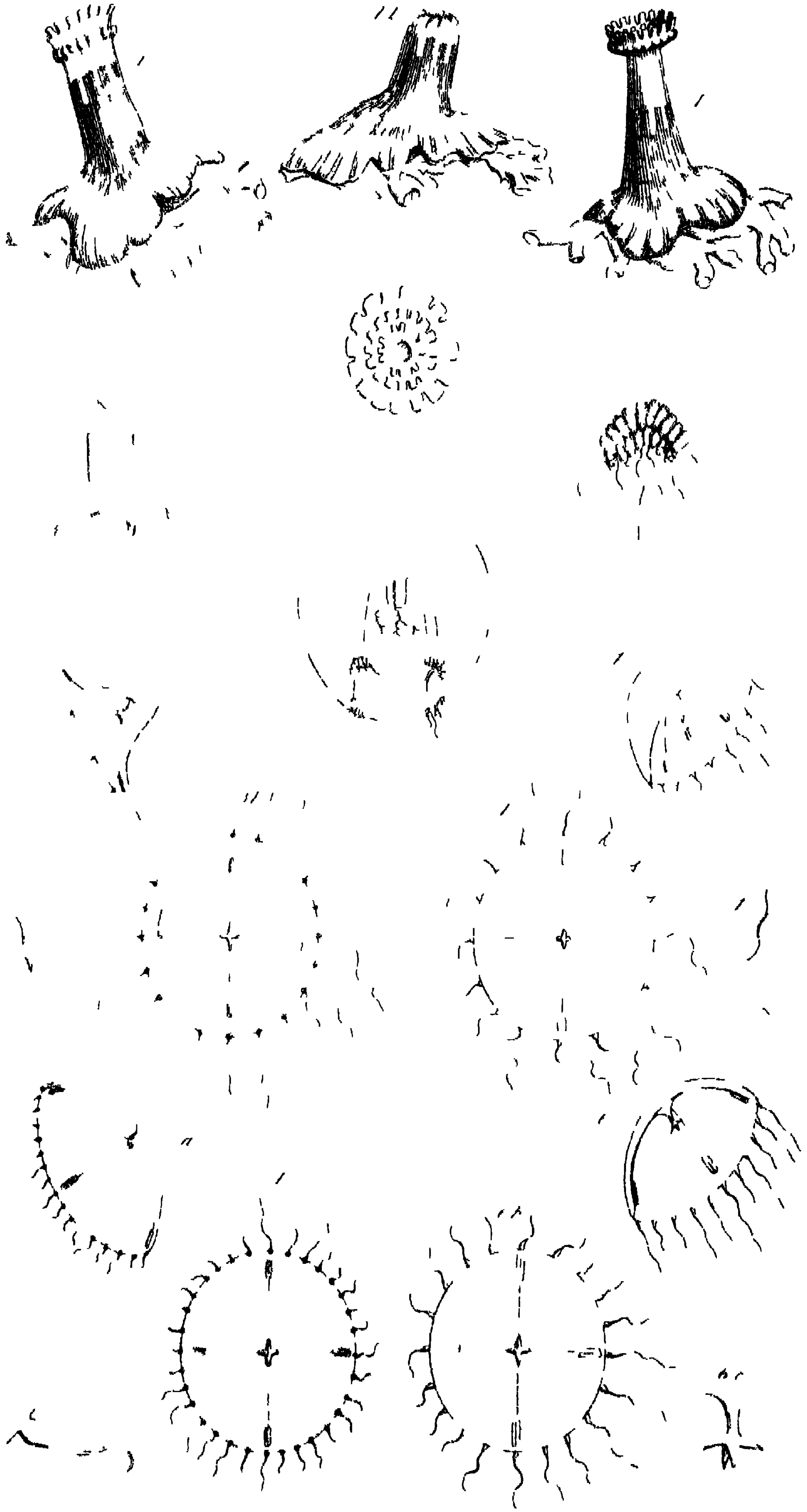
Calm 6 days. Moderate 11 days Brisk 4 days. Strong breeze 4 days Boisterous 3 days

Mean temperature of the month	36°	50
Mean temperature of February 1840	36	78
Mean temperature of spring water	42	60
Mean temperature of spring water, Feb 1840	44	16

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr Roberton, *by* Mr Thompson *at the Garden of the Horticultural Society at Chiswick, near London, by* Mr Veall *at Boston, and by* Mr Dunbar *at Applegarth Manse, Dumfries-shire*

Days of Month 1841 Feb	Barometer						Thermometer								Wind				Rain				Dew-point
	London Roy Soc 9 a m.	Chiswick		Boston 8¾ a.m	Dumfries-shire		London Roy Soc			Chiswick		Boston 8¾ a m	Dumfries-shire		London Roy Soc 9 a m	Chiswick 1 p m	Bost.	Dumfries-shire	London Roy Soc 9 a m	Chiswick	Boston	Dumfries shire	Lond Roy Soc 9 a m
		Max	Min		9 a m	8¾ p m	Fahr 9 a.m.	Self register Max	Self register Min	Max	Min		Max	Min									
1	30 358	30 346	30 268	30 12	30 42	30 47	30 7	42 0	29 7	31	23	32	35	32	N	NE	calm	NE	116				30
2	30 072	30 093	29·931	29 90	30 25	30 10	27 7	32 4	25 8	31	18	28 5	33	26½	N	NE	calm	NE					24
3	30 000	30 020	29 977	29 80	30 07	30 01	22 2	29 7	21 6	28	14	25 5	33	27½	N	E	calm	ENE					20
4	29 760	29 803	29 670	29 62	29 87	29 77	25 7	25 7	22 2	30	22	27	34	27	E	NE	E	NE					21
5	29 682	29 722	29 688	29 55	29 78	29 85	25 7	30 0	24 6	30	26	29 5	34	30½	NE	NE	E	NE					22
○ 6	29 648	29 661	29 609	29 56	29 80	29 78	27 3	29 8	25 2	28	24	28	30½	26½	NE	E	E	E					24
7	29 480	29 500	29 443	29 46	29 65	29 58	23 8	28 8	23 8	27	24	23 5	28½	27½	NE	E	E	ENE				0 05	20
8	29 372	29 442	29 395	29 24	29 50	29 57	26 7	26 7	24 0	29	26	26	31½	27	N	NE	E	NE					23
9	29 636	29 952	29 645	29 47	29 70	29 87	27 4	29 3	27 2	30	27	28 5	32½	28½	N	NE	E	NE					24
10	30 014	30 017	29 959	29 76	29 80	29 68	28 3	30 2	27 0	32	27	27 5	33	27	SE	SE	calm	NE		04			25
11	29 850	29 866	29 657	29 58	29 53	29 38	36 7	37 2	27 0	41	37	33	39	29	SE	S	calm	E		04			28
12	29 672	29 745	29 640	29 33	29 40	29 48	41 7	42 5	35 6	51	38	38	40	36	S	SW	calm	S		04	58		36
☾ 13	29 672	29 659	29 313	29 30	29 28	29 02	44 8	40 0	41 4	51	44	41	45	37½	SSE	S	calm	SE		01	10		39
14	29 180	29 288	29 157	28 82	28 94	28 87	47 3	48 3	45 0	52	41	43	45½	41	S	SW	calm	SE	022		09	2 06	42
15	29 274	29 263	29 071	28 89	28 95	28 85	43 4	51 4	42 4	49	42	43	45	38	SSE	S	calm	ESE		15			42
16	29 076	29 141	29 086	28 73	29 00	29 19	45 7	49 2	42 5	51	39	42	46	39½	E	SE	calm	SE	091	11	15		43
17	29 268	29 584	29 584	28 97	29 30	29 34	40 3	50 0	40 8	46	36	36 5	46½	41	NW	W	calm	SE	125	01	06		41
18	29 642	29 614	29 490	29 26	29 24	29 26	43 3	45 4	40 7	53	38	40	45	38	SE	S	calm	S		04	02		41
19	29 672	29 744	29 601	29 22	29 44	29 43	46 8	51 4	43 0	50	35	44	45	41	S	SW	calm	SW	088	02			46
20	29 846	29 977	29 808	29 33	29 51	29 85	46 7	50 0	40 4	56	40	42	48	40	S	S	SE	S	033	11			45
● 21	30 198	30 296	30 162	29 77	30 05	30 15	45 3	52 2	44 7	56	29	36	46	38½	NW	NE	calm	S	063		15	1 56	44
22	30 390	30 345	30 323	29 93	30 18	30 19	40 3	50 2	40 2	42	38	32	46	38	NW	NE	calm	SW					42
23	30 356	30 323	30 298	29 98	30 24	30 28	38 6	43 7	38 6	44	32	38	48½	41	NE	NE	calm	NE					41
24	30 328	30 304	30 298	29 95	30 39	30 45	34 7	41 3	33 8	40	36	36	46	37	N	NE	E	N		01	07		36
25	30 336	30 308	30 076	29 98	30 33	30 04	38 8	41 5	33 8	42	35	38	45	31½	N	NE	calm	W		07			37
26	29 378	29 872	29 638	29 47	29 80	29 67	43 7	44 5	38 7	48	35	41 5	48	41	WNW	NW	calm	NW	108	04	07		42
27	29 756	29 730	29 368	29 36	29 80	29 87	39 7	47 7	37 0	45	32	38	43½	34	NW	N	N	NNW	100	07	24		37
☽ 28	29·880	29 874	29 681	29 52	29 76	29 47	36 9	43 3	35 0	47	32	35	43½	28½	WNW	NW	calm	NNW	044		05	0 11	34
Mean	29 778	29 833	29 708	29 49	29 713	29 695	36 4	40 8	34 0	41 42	31 78	34 7	40 5	33 2					Sum 790	76	1 58	3 78	Mean 34

Ann & Mag Nat Hist Vol 7 Pl 1



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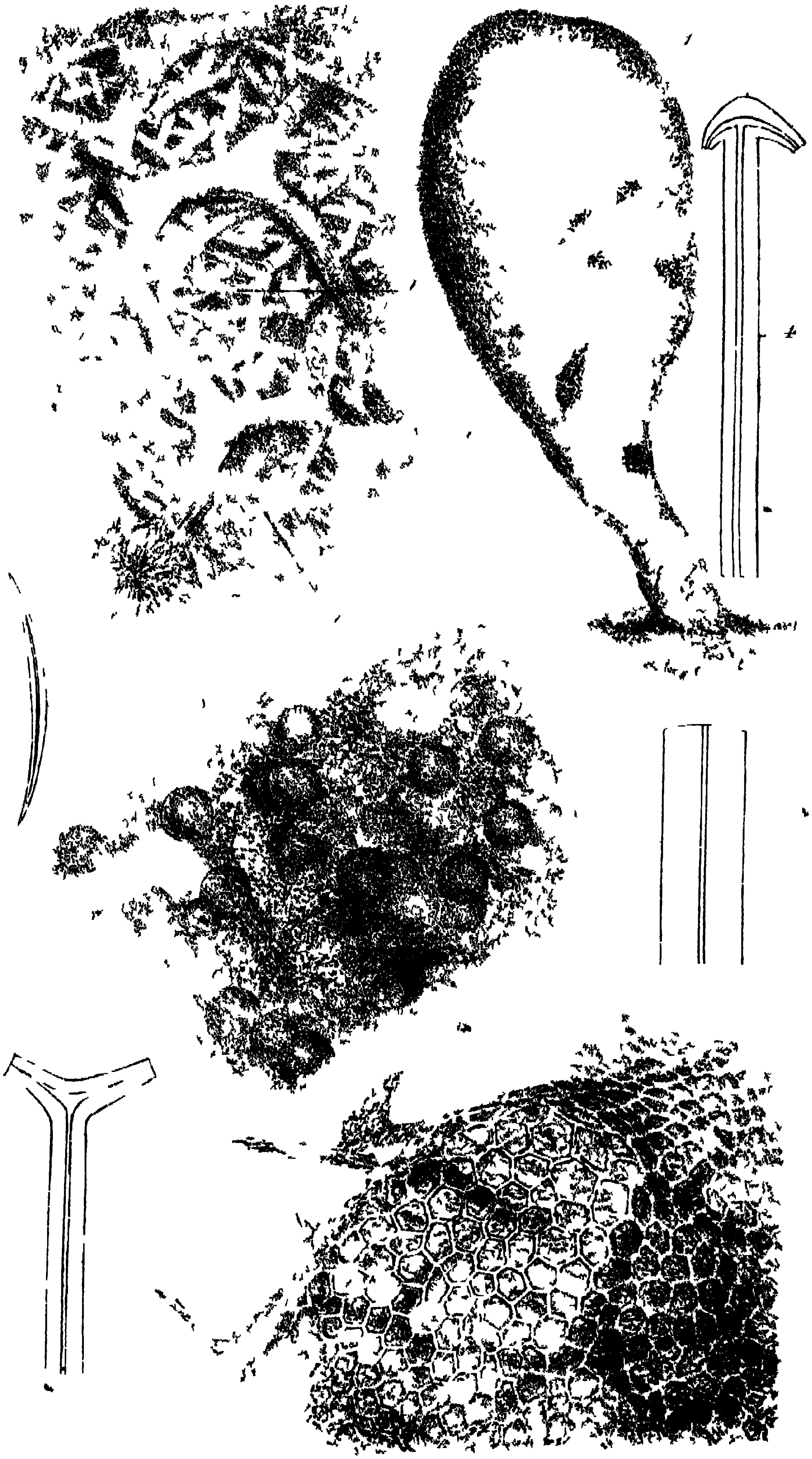
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THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

No 43 MAY 1841

XIX —*On the Alteration which the Atmosphere undergoes during the Development of Heat in the Spadix of* Colocasia odora

By Professors G Vrolik and W H De Vriese

[Communicated by the Authors]

Having communicated last year to the first class of the Royal Institute of the Netherlands our experiments regarding the influence of the spadix of *Colocasia odora* on the surrounding atmosphere, we have, in repeating the experiments, constantly obtained the same results with the flowers of this species Thus convinced that our researches have risen in scientific value, we now subjoin the final result of them

We used for this experiment the apparatus already described and delineated*, but we did not employ water for closing the gas jar, but mercury, as was also the case with the experiments communicated last year

We placed the flowers in this apparatus, having previously cut away the greatest part of the spatha, and having varnished the remaining part in such a manner that all evaporation or absorption was prevented, and the green surface could not thus exercise any influence

We determined the degree of heat in the usual way, but we have not kept our notes on this as fully as before, it not being now so much the object to make this known, as to consider the development of heat, in connexion with the alteration, which, during it, the atmosphere undergoes For the same reason no account has been given of all the experiments which we have made

July 9th, 1839 —*Experiment with a plant planted in the open ground in a hot house* An idea can scarcely be formed of the vigorous development of the plant treated in this way Most of the leaves had a petiole of 1 60 Dutch ell (metre) in length From the union of the petiole with the stem to the apex of the middle nerve, the length was 0 66—0 80 D. ell, the breadth at the longest diameter was 0 68 The spadix was nearly as large again as usual

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* Tijdschrift voor Nat. Gesch en Phys Deel V, p 139, pl. V —Ann des Sc Nat, 2nde Sér, Fevr 1839

We must avail ourselves of this opportunity to observe, that we have already (in 1835) declared our opinion regarding the identity of *Colocasia odora* with *Arum cordifolium* briefly described by Bory de St Vincent* This learned gentleman has confirmed in every respect the opinion which we gave in 1835, in our first treatise on the elevated temperature of *Colocasia odora* Our opinions on that subject were fully given in the French translation of the treatise, which was sent to the Editors of the 'Annales des Sciences Naturelles' If thus *une faute d'érudition botanique* has taken place, by whomever it may have been, it has not been committed by us† In Froriep's 'Notizen' of 1836, our treatise was inserted from the 'Tijdschrift voor Natuurlijke Geschiedenis,' and there also the conviction may be obtained, that we had not from the beginning any doubt of the identity of *Colocasia odora* with *Arum cordifolium* Perhaps at some future period we shall revert to this subject

After this short digression, we now subjoin the table of our observations on the 9th of July, 1839 —

Hour of Observation	Temperature of the Spadix	Temperature of Gas Jar
A M 9¾	18° C	18° C
11	21	18⅕
11½		
11¾	21⅕	
P M 12½	22	
1¼	23⅘	
1¾		
2½	23⅕	18
3	22	,,
4	21	

On that day the development of heat gradually decreased, and even on the following day at noon it was scarcely observable for half an hour The air in the jar was then chemically analysed, oxygen was not found in it, but it was proved that this gas had been replaced by carbonic acid gas

It is a most remarkable phænomenon, that while the increase of heat had generally been observable for three days, it now nearly ceased on the first day In our opinion, the disappearance of oxygen, and its being replaced by carbonic acid gas, was the cause of this, the quantity of oxygen gas in the jar being once absorbed, the development of heat, losing the stimulus which is indispensably requisite for its existence, must necessarily discontinue

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* Voyage dans les quatres grandes iles de la mer d Afrique, fait en 1802, II Paris, 1804, p 66

† Vid l'Institut, Mai 30, 1839, No 283, p 184, Sept 5, 1839, No 297, p 312

Judging that by this experiment we have nearly arrived at the right explanation, we think that our former experiments, especially the one of 1838*, concerning the influence of nitrogen on the spadix of the species here alluded to, must be brought into connexion with it There was *then* no development of heat whatever, the oxygen gas being wanting, *here* it had entirely ceased after a few hours, because all the oxygen gas was absorbed from the atmosphere On considering this phænomenon, the question readily presents itself,—does the oxygen liberating caloric combine with the carbon contained in the plant to form carbonic acid, and is thus the development of heat, combustion? We are inclined to think so, for when the development of heat has reached its maximum, which is the case in the middle of the day, then also the alteration which the enclosed air undergoes is greatest, as was proved by an experiment we purposely made on the 27th of last June With this view, we placed at that time in the apparatus, in which a spadix was enclosed, some potash, in order to absorb the carbonic acid in the same ratio in which it was produced During the time the absorption was taking place, we saw the mercury rise several inches within the space of one hour

As yet we had made these experiments with the same sort of thermometer we had previously used, but we wished to repeat them with a thermo-electrical apparatus for this purpose we procured one of M Becker, philosophical instrument maker in Groningen, who last year, after the flowering of our Colocasias, constructed a most excellent and delicate instrument of this description, with the physiological needles of Becquerel appended to it

On making these and other experiments, we found, that although the increase of temperature was not quite imperceptible on the second day, yet it was too trifling to attach any particular value to it On this ground we think we may state, that on the first day all the oxygen gas had not been completely absorbed

The experiments with the thermo-electrical apparatus, and also all the former ones, were taken in a room of nearly an equal temperature Either in the dark or in the light the results presented scarcely any remarkable difference The physiological needle was stuck in the spadix to the depth of one millimetre, which for this purpose was introduced through a copper ball fixed at an opening made in the jar, and moveable in all directions, which apparatus was made with the utmost accuracy by M E Wenkebach, philosophical instrument maker at Amsterdam

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* Vid Tijdschr voor Nat Gesch en Physiologie, Deel V, p 222

The analysis of the atmosphere produced the same results as in the former experiments, viz the replacing of oxygen gas by carbonic acid gas

As soon as an opportunity presents itself for the repetition of these experiments, we shall endeavour to maintain the usual proportion of the gases from the atmosphere in the jar, by supplying oxygen gas in the same ratio as it will be found to be absorbed from the enclosed air, and by removing the newly-formed carbonic acid gas

We do not doubt, that by this mode of proceeding, the elevation of temperature in the spadix of *Colocasia odora* can be kept up the second and third day, and perhaps even to a longer period

Amsterdam, August 13th, 1840

XX —*Note on the Occurrence of the Genus* Diphya *on the Coast of Ireland* By G C Hyndman, Esq, Member of the Natural History Society of Belfast

Whilst dredging in Belfast Bay on the 6th October, 1838, I had the pleasure of taking in a small towing-net, along with a number of Beroes, a specimen of the remarkable genus *Diphya*, Cuv, the occurrence of which in the British seas is hitherto unrecorded

With Cuvier's definition of the genus the specimen exactly agreed, as it did with that of Blainville, except that there were no teeth round the aperture of the swimming cavity, as described by the latter author This appearance instead arose from the extension of the acute ridges by which the body of the animal is formed, and which is indeed shown by the figures in Pl V of his 'Actinologie' Referring for the species to this work, to Eschscholtz's 'System der Acalephen,' to Comte's and to Guérin's 'Illustrations of Cuvier's Règne Animal,' and to Jones's 'Outlines of the Animal Kingdom,' the only works in which I have had the opportunity of seeing the genus represented, I find that my specimen differs in species from all in its more elongated form, I should therefore propose to name it

DIPHYA ELONGATA

Spec Char Both portions of similar form and nearly equal size, the swimming cavity of each likewise similar, and, as well as the nutritive organ, extending the whole length of the body

The animal or animals when first taken were united, as shown in the sketch, the whole body being of a most beautiful transparency, so much so, that it was extremely difficult to distinguish it in the clear sea-water The only coloured part was the long tentacular appendage, which was of a light reddish colour, and only to be seen in the larger individual The motion of the *Diphya* through the water was caused by the contraction of an elongated cavity having an open round aperture fringed with what had the appearance of a soft membrane without any ciliæ, by which contraction the animal was rapidly propelled through the water with the pointed end foremost in a series of jerks, agreeing with the motion attributed to the genus by Eschscholtz At other times, when lying undisturbed, there was no appearance of animation except a very slight movement of the tentacula, nor was the circulation perceptible under a strong lens, but on examination under a powerful microscope, a circulation was discovered commencing in the canal which originates at the base of the tentacular appendage, and continuing throughout the nutritive organ

In removing the *Diphya* for examination in the microscope the two bodies separated, when each appeared quite a distinct animal, capable of precisely similar motions, the only difference between them being, that the smaller one was destitute of the tentacular appendage, and the pointed end was furnished with a lamina, as in sketch

Of the nature of the connexion between the two individuals, or of the functions of the tentacular appendage, I was unable to satisfy myself during the short period allowed me for their examination, the smaller one having died the day after its separation, and the larger one having remained in a languid state, with its tentacula contracted, until the third day after its capture, before which time I had not the means of examining it under a good microscope

I have delayed this communication so long in the hope of being able to procure further specimens, but as yet I have been unsuccessful, although the probability is, that the animal may not unfrequently be met with on this coast, as Mr Thompson lately pointed out to me a dried specimen of another individual of the same species, which I had picked up on the coast near the Giant's Causeway in July 1837, and not being able to determine had handed over for his investigation

Fig 1

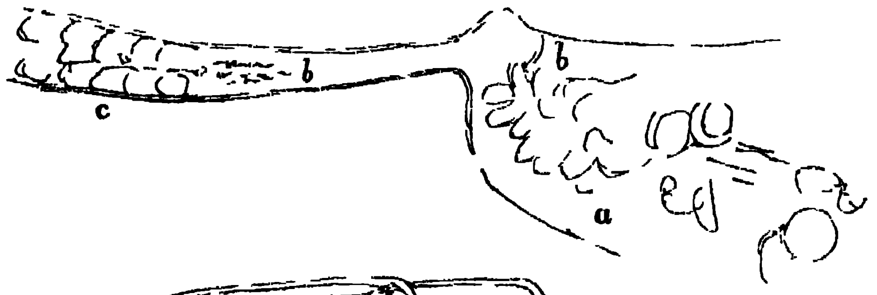

Fig 2

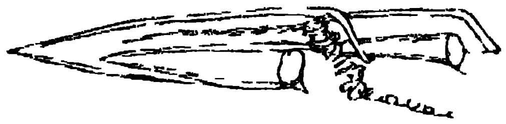

Fig 3

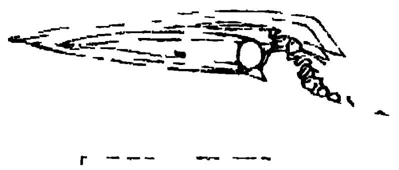

Fig 4

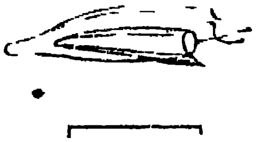

Fig 1 A highly magnified view of the base of the tentacular appendage and part of the nutritive organ *b, b* Groups of opake particles in motion at these places, the circulation going on throughout the divisions of the oblong vessel *c*

Fig 2 The two animals united, as first taken

Fig 3 The larger individual with the tentacular appendage

Fig 4 The smaller individual

When viewed under a lens, the ridges of the body are seen to be serrated along the edge

XXI —*Report of the Results of Researches in Physiological Botany made in the year* 1839 By F J Meyen, M D, Professor of Botany in the University of Berlin*

[Continued from vol vi p 429]

M Unger, in a treatise on the organs of fructification of *Riccia glauca*†, has made a few but very important remarks on the present question concerning the sexuality of Phanerogamous plants. His researches on the stigma are by no means favourable to the theory of M. Endlicher, according to which the moisture of the stigma is the fertilizing substance, and he moreover states, that there is just as little foundation for the theory of M. Schleiden, according to which the embryo-sac effects the fertilization. M. Unger gives the question quite another direction, and one which, as he believes, corresponds better with the nature of the subject. He says: What important objection could be made to the supposition, that the pollen grains, when they arrive on the stigma, are already fecundated? Does not analogy lead us to suppose that their formation is a work of fertilization? In this case, the male organs of plants must be sought in the anthers or the neighbouring parts, etc. M. Bernhardi* has expressed new doubts concerning the general idea, that the formation of the seed, in Phanerogamic plants, depends solely and alone upon sexual contact, he brings forward observations which are unfavourable both to the old and the new theory of fecundation. Bernhardi calls the followers of the old theory the Animalculists, and those of the new, who seek the germ of the future plant in the contents of the pollen, the Pollenists. Against the doctrines of the Pollenists he brings forward the observations of Gärtner, namely, that many seed-bearing hybrids, by being continually grown from seeds, return into the primitive form, for this cannot be otherwise explained than by the assumption that in this case the female parent had a greater share in the formation of the embryo than the male. The only means of escape left for the Pollenists, is to ask whether these observations are quite correct or not. The most important part of M. Bernhardi's work, however, treats of the observations, according to which seeds perfectly capable of germinating have been formed in the ovaries of several plants without previous contact with pollen, in this case, therefore, the female alone was sufficient for the formation of the seeds. The observations of different botanists are here mentioned, and moreover, in order to render such a production less incredible, many statements—according to which animals, as insects, salamanders, etc., have produced young without previous fecundation—are brought forward. The numerous experiments which M. Bernhardi has made with all possible care with the hemp plants, and their results, are circumstantially described. In April 1811 he sowed thirty seeds, and obtained twenty-one plants, nine male, twelve female. From

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* Translated from the German, and communicated by Henry Croft, Esq

† Linnæa von 1839, pp 15 17

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[*] Ueber Bildung von Saamen ohne vorhergegangne Befruchtung.—Otto's und Dietrich's Allgemeine Gartenzeitung 1839, No. 41, 42.

two female plants which were allowed to stand he obtained twenty-eight seeds, which, sowed in 1812, produced twenty plants, ten male and ten female Two of these females produced twenty seeds, and from these were obtained, in 1813, fifteen plants, eight male, seven female From these, thirty seeds were produced, which gave, in 1814, nineteen plants, twelve male, seven female, and thirty-two seeds from these produced, in 1815, twenty-one plants, sixteen male, five female, only two of these females were allowed to stand, from which were obtained twenty-five seeds, which produced, in 1816, fifteen male and two female plants In these experiments the male plants were destroyed in a very early stage, while they had perfectly undeveloped anthers, only two females were allowed to remain, in order that it might be easier seen whether some male flowers had not been produced between the female ones The most curious result of these observations is, the formation of mature seeds without fecundation, for this could not be observed, and moreover it is very remarkable, *that the proportion of male plants to the female ones increased regularly* the plants were cultivated on a rather poor soil As far as concerns the first result, I consider that it is by no means proved by these new observations, that in the case of the hemp plant, or other Phanerogams, seeds are produced without fecundation, it may be asked whether these experiments are perfectly correct However, observations made by such trustworthy men as M Bernhardi cannot be put aside without sufficient reasons, and it is therefore advisable that these experiments be repeated next summer with all the care which such a subject requires I have observed the formation of pollen in such very unusual places in other plants, that something similar might perhaps be supposed to take place in the cases above mentioned

Mr J Smith* made a communication to the Linnæan Society concerning a new plant from New Holland, which had been sent to England by Cunningham in 1829, and had flowered every year in the garden at Kew, and borne ripe fruits, although the flowers were all females, no trace of polliniferous organs could be seen The plant forms a new genus of the Euphorbiaceæ

I have also been obliged to publish a small work†, in which are discussed the phænomena I have observed during the actual fecundation, namely, on the conjunction of the pollen-tube with the embryo-sac, and at the entrance of the pollen-tube into the cavity of the nucleus. The greater part of these observations is already published in the third part of my 'Physiology,' but here all the facts which have reference to this subject are arranged together, and indeed more clearly than at first, for many points have become more evident to me by continued observation. An eminent physiologist has stated, that it appeared from my experiments that the embryo was produced by the injection of the fovilla, or fertilizing substance of the pollen-tube, into the embryo-sac, but I never had such a view of the act of fecundation of plants, and in the above-mentioned treatise the meaning of the observations is explained more clearly. In some species of *Mesembryanthemum* I have been able to observe the union of the pollen-tube with the embryo-sac much more accurately than before, particularly the curious lateral junction of the apex of the pollen-tube with the side of the summit of the embryo-sac in the case of *M. pomeridianum*.

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* Annals of Natural History, September 1839, p 68

† Meyen Noch einige Worte uber den Befruchtungsakt und die Polyembryonie bei den hoheren Pflanzen Mit 2 Steintafeln in quarto, Berlin, 1810 —[A translation of this work will appear in the forthcoming Part of Taylor's Scientific Memoirs —Ed]

In consequence of this junction, in which the act of fecundation consists, there is formed at the summit of the embryo-sac, directly under the point of junction, a little bladder, the so-called germinal vesicle (Keimbläschen), from which the suspensor and the embryo-bladder are produced, which is described and delineated. I never saw a larger embryo-sac than in this *Mesembryanthemum*, in which the ovulum is half curved, and is twisted back by a bend in the umbilical cord. In the case of *M. [illegible]nguæforme*, the junction of the pollen-tube with the embryo-sac takes place exactly at the extremity, and after the germ-bladder is formed, the end of the pollen-tube enlarges considerably, and remains so for a very long time, while in perfectly similar species the pollen-tube disappears directly after fertilization, etc.

M. Decaisne* has laid before the Academy of Paris a very interesting research on the development and structure of the flowers of *Viscum album*, and MM. Mirbel, Jussieu, and Ad. Brongniart have given a report of the results, of which we can here mention only the most important.

The cells of the anthers and of the calyx-leaves, with which the former are grown together, do not exhibit in their form any difference, except that the latter are filled with a green substance, whereas the former are colourless. Five months before blossoming the cellular tissue of the anthers is uniform, and is divided into small cavities with green sides or walls. These cavities increase, and their cellular contents vanish in order to make room for other cells of large size, which are called "les utricules polliniques" (so-called primitive or mother-cells, Mutterzellen), and for one or two nuclei mixed with an infinite number of very small globules; the nuclei are the commencement of the pollen-grains; these "utricules" thicken, become opake, and exhibit concentric, more or less regular, layers in their circumference; and finally in each tube (Mutterzelle! M.) there are enclosed four yellowish nuclei, which are more or less rounded, and have in the centre a bright spot. Afterwards, the substance which caused the thickening of the "utricules polliniques" deposits itself between each of the four nuclei which were contained therein, and produces cavities having the form of the nuclei (this is the formation of the special primitive cells, Specialmutterzellen, M.), and finally this substance disappears, and the pollen grains are found lying free in the cavity of the anther. In this matured state they exhibit small papillæ on their surface; and when the nucleus which they previously contained has disappeared, an inner membrane is also to be seen. The anthers of *Viscum album* do not possess those retiform cells which are seen in so many other plants.

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* Développement du pollen dans le Gui, changemens que présentent ses ovules et ceux du Thesium.—Comptes Rendus de 1839, 11 Février, p. 201.—[Translated in the Annals of Natural History for May 1841, p. 185.—Ed.]

From the first appearance of the flower, the ovarium, as well as the anthers, coheres with the calyx, and it consists of a green, uniform, cellular mass, in which no cavities are to be distinguished. Some time after the blossoming one observes two small holes, which are formed in the circumference of the ovarium, and in the centre of the cellular tissue. After fertilization these cavities increase, and on their junction they represent the cavity of the endocarpium. In Paris the Misseltoe blossoms in March or April, and the ovulum appears at the end of May or in the beginning of June. About this time it makes its appearance as a pulpy wart, fastened to the base of the endocarpium; it is generally accompanied by two fine filaments, which are the rudiments of two abortive ovula.

As no ovulum-tunics (eyhullen) were observed, M. Decaisne concludes that the ovulum is here in its simplest form, and consists solely of a nucleus; but from observations I have made, it is evident that the embryo-sac, with the contained albuminous body and the embryo, were mistaken for the naked ovulum or simple nucleus; the following statements are therefore to be corrected, the proofs of the above will appear hereafter in a research by myself. The report proceeds thus When the seeds of *Viscum* contain more than one embryo, it is to be explained by the development or cohesion of two ovula, of which one is generally abortive, etc The green vascular covering which is seen on the ripe seed, constitutes, according to M Decaisne, a part of the fruit, and is the endocarp This will however be seen to be incorrect

M Schleiden* has published some remarks on the flowers of the Loranthaceæ, and particularly of *Viscum album*, he draws attention to the fact that this form of flower is probably the simplest which can exist, for it consists of two pairs of leaves placed in a circle, which in the male flowers are metamorphosed into anthers, and in the females have more the nature of a calyx Between these sits the straight, naked nucleus, and the embryo-sac is said to be formed in the pith of the stalk (pedunculus) The grains of pollen appear on the top of the nucleus, enter into it several together, and thus produce the Polyembryony M Schleiden considers the berry to be the pedunculus, which has become succulent, and whose tissue is metamorphosed into that harder and firmer kind which forms the skins of the seeds The regular form of the anthers of *Viscum album* is usually bilocular and four-celled, but each cell is divided into several compartments by partitions, and regular anthers seldom occur on account of monstrosity In *Viscum verticillatum* the spike consists of three pairs of bracts, the upper pair has only one flower, and each of the others three, which afterwards form a "*Verticillus spurius*," while the end flower is wanting In *Loranthus* the point of the naked nucleus is lengthened so as to assume the appearance of a style At the end M Schleidan observes, that the Loranthaceæ, in a parasitic form, represent the intervening step between the Coniferæ and the higher families

I have also published some observations on the formation of the seeds of *Viscum album*† The Polyembryony so often observed in the seeds of this plant is caused by the appearance of several embryo-sacs together, only one of which, however, usually becomes fully developed, while the others are abortive, I could not observe anything confirmatory of the statement of M Decaisne, viz that the embryo in this plant consists of several single embryos grown together It is by no means seldom that several embryo-sacs contained in the same nucleus are fertilized, but six or eight weeks afterwards only one of them comes to perfect development, and therefore the doubling or trebling of the radicular end of the embryo of *Viscum* cannot be explained as owing to the cohesion of several embryos

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* Botanische Notizen In Wiegmann's Archiv, etc v 1839, i 211-214

† Noch einige Worte, etc etc, pp 39 50

The structure of the female flower of *Viscum* is very simple, it consists of a single bottle shaped nucleus, which is surrounded by a calyx-like organ from which, at a later period, the white fleshy and gummy matter is produced which encloses the seeds and represents the pericarpium In this calyx are inserted the leaves which may be held for petals, in the male flowers they are metamorphosed into anthers In *Viscum* the nucleus is always situated on the apex of the principal or collateral axis, the end of it receives the pollen, and therefore takes the place of the micropyle, but in the base of the nucleus is formed the embryo-sac, which grows upwards into the cavity which has been formed in the nucleus, and therefore the embryo-sac is not developed in the point of the stalk, as M Schleiden has stated, but just as usual, in the interior of the nucleus I could never observe the fecundation by means of pollen-tubes, but directly after fecundation the embryo-sac becomes divided by means of partitions into a number of large cells, in which, at a later period, the albuminous body is formed The embryo remains four or five weeks in the first stage of development in form of a small vesicle in the top cell of the embryo-sac, and when almost all the cells have produced albumen, it increases with great rapidity, and breaks through all the partitions of the embryo-sac from the top downwards A series of drawings is annexed to the Memoir, and will give the requisite explanation

Towards the end of the year I was fortunate enough to find a specimen of misseltoe which had two embryos in almost every one of the numerous seeds, which germinated very well when laid on the moist window-frame There were the same number of rootlets as of perfect embryos in the seed, and the embryos were generally a little conjoined at their cotyledon end, but a complete cohesion never took place The curious position which the embryos in the misseltoe seeds assume when there are several together, may be explained by the growing together of the albuminous bodies and by their peculiar form Each embryo is formed in the axis of its own albuminous body, which at the micropyle end becomes ten or fifteen times thicker than at the lower end, and therefore, when their edges grow together, their axes must form an angle with each other, which varies from 40° to 60°

I have also made some remarks on the different circumstances under which Polyembryony appears

M Horkel* read a treatise in the Academy of Sciences of Berlin concerning the Polyembryony of the Coniferæ, his own researches on this subject agreed perfectly with those of Robert Brown In 1819 he had observed the small cavities which appear in the end of the albumen of *Abies excelsa*, and in the seed of *Pinus Cembra* he observed, together with the embryo, two abortive rudiments In *Abies excelsa* M Horkel observed the rudiments of the ovula assume that form in which Robert Brown has called them "Funiculi," they lay in the middle of the great cavities of the albumen, parallel to each other, generally three together, seldom four, but M Schleiden has observed six rudiments in *Pinus echinata* In *Taxus baccata* M H never saw fewer than two rudiments, but generally three, but sometimes there is only one cavity in the apex of the albumen In the Cupressineæ M Horkel always found only one cavity for the formation of the embryo, lying in the axis of the albumen, but always two or four pollen-tubes entered the cavity, the Polyembryony of these plants may therefore be ranked with that of *Citrus*, it is, however, not so accidental, but belongs more to their nature

M Decaisne† has published some interesting researches on the structure and fecundation of the ovulum of "Thesium," which confirm the opinion I gave of Griffiths's description of the structure of the seeds of *Santalum album* (former Report, p 33) A short time after fecundation has taken place a tube (Schlauch) is seen to proceed out of the ovulum, this tube connects itself with another very fine one which descends into the cavity of the ovulum from above After the combination of these two has taken place, the tube swells and assumes the form of a bladder, the lower part becomes filled with cells This tube is the embryo-sac, in the top part of which the embryo is formed in shape of a small round bladder, and what is most remarkable is, that it is quite naked, and therefore lies outside the nucleus (we have already shown that this is also the case with Leguminosæ, where however the embryo-sac is enclosed in tunics (Eyhullen, M)), and that the seed is also naked, only covered by the thin membrane of the embryo-sac During this formation of the embryo one observes that a simple tube is formed, which is digitate at the bottom and swollen at the apex, the column pierces this bag, in the centre of which it is enclosed, towards the point of insertion of the impregnated ovulum, and places itself with its swollen end (in the form of a retort) over one of the apices of the sac of the neighbouring embryo M Decaisne considers this peculiar tube to be a nutritive vessel, which replaces at the same time the chalaza, and I myself believe (although I have not examined the subject) that this tube is either directly produced out of the end of the pollen-tube, as in the case of *Mesembryanthemum linguæforme*, or that it is a peculiar formation of the embryo-supporter, as in *Ceratophyllum*, etc

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* Berichte uber die Verhandlungen der Academie der Wissenschaften zu Berlin, aus dem Jahre 1839, p 92

† De l ovule du Thesium —Compt Rend 1839, No 6, p 203

M Emil Kratzmann[*], in his inaugural dissertation, has treated of the seeds of plants, and although he remarks in the introduction, that his work is only a compilation and does not pretend to originality, still I cannot but recommend this carefully compiled and complete paper to all those who have not access to the larger botanical works The treatise is divided into five parts, namely, of the præformation-stadium of the seed, of its production and formation, its evolution (ripening), then of the structure of the ripe seed, etc, and lastly of the circumstances under which the germination of the seed takes place

M Adrien de Jussieu[†] has published a very interesting research on the embryos of the Monocotyledons after an historical introduction he gives the general characters of the monocotyledonous embryos, and then proceeds to the enumeration of the peculiarities exhibited by the embryos of the different genera The most common form of the monocotyledonous embryo is either that of a cylinder with rounded ends, or of a more or less lengthened ellipsoid Sometimes the cotyledon end is broader, sometimes, and indeed more frequently, the radicular end is enlarged, often the small blunt point on the radicular end, at which the suspensor terminates, remains, but before the ripening of the embryo it always projects The position of the bud (Knospchen) is determined by that of the rootlet, it appears as a small prominence at one side of the circumference, this projection is seen in the cotyledonar fissure In rare cases this cleft is opened its whole length, and its sides allow the first leaflets of the bud to be visible throughout their whole length, as in the case of *Ouvirandra* In other cases the sides of the clefts touch in the middle, and separate both upwards and downwards, and in this case the apex of the blossom comes out through one of the openings (the upper one), as in *Aponogeton distachys*, etc., or as in *Sparganium ramosum*, *Commelina tuberosa*, etc., where no trace of it is seen. In most cases the sides of the cleft are connected the whole length, and the cleft appears then as a line, which is either straight or curved, a transverse section then shows the position of the edges of the cleft. All these cases are fully explained by a series of beautiful delineations. The little bud appears in the form of a small wart at the bottom of a circular, oval or lozenge-shaped frame (Einfassung), in *Amaryllis carnea* the edges of the cleft are open only above, and the rest of their length they are grown together. The cleft appears horizontal (*Veratrum*), and when the edges become lengthened it acquires the appearance of a divided or even of a simple ligula, according as the inner edges are more or less perfectly connated. In *Rajania hastata* and *Tamus communis* the inner edges remain free. Finally, says M. de Jussieu, the destruction of the continuity in the cotyledon end of the embryo can sink to a mere point, as is very frequently the case in the Gramineæ and Cyperaceæ, or this point may entirely escape observation, however, all these modifications are only different degrees of the same organization. As one may draw a conclusion concerning the position of the bud from the position of the cleft, one soon observes the relation existing between the cotyledon and the radicle end, the former is often much larger than the latter.

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[*] Die Lehre vom Saamen der Pflanzen Mit 4 lithographirten Tafeln Prag 1839 8

[†] Sur les Embryons monocotylédones —Lu à l Académie des Sciences dans le séance du 1 Juillet 1839, Ann des Sciences Naturelles, Part Bot 1839, i 341—361

M. de Jussieu then proceeds to the examination of Lindley's theory, according to which the monocotyledonous embryo may be considered as a dicotyledonous, from which one cotyledon has disappeared, and the other has wound itself round the plumula and grown together at the edges. M. de Jussieu brings forward a number of interesting observations in opposition to this theory, and arrives at the result that the monocotyledonous embryo, as far as regards its cotyledon part, may be perfectly compared to a bud. Finally, the variable forms which the monocotyledonous embryos assume are considered, and the author concludes, that the stem of some monocotyledonous embryos has a disproportionate excrescence on one side, which has to a certain extent the appearance of a cotyledon, and performs its functions, particularly in such cases where the true cotyledon is imperfect, and reduced to the state of a mere case or sheath. It is to be expected, that this subject, treated of by M. de Jussieu, will shortly receive its perfect solution, it is however a gigantic work to examine the genesis of all the above-mentioned monocotyledonous embryos, particularly as it appears that the formation of the cotyledon is different in various families. I here refer to what I have observed of its formation in *Mais*.

In the Botanical Society of Edinburgh* Mr. Giraud read a treatise on the structure and function of the pollen, from which it appears that he has arrived at the same results as have been published in the modern German works on this subject. In *Crocus vernus* Mr. Giraud saw three pollen tunics, and on the surface of the pollen grains of *Polemonium cœruleum* he found small opake particles, which exhibited a peculiar motion as soon as put into water. The grooves which are found on some spherical and ellipsoidal pollen grains do not appear to Mr. Giraud to be clefts in the outer membrane. The chemical examination of pollen showed the presence of potash in the pollen of *Antirrhinum majus*, as also of acicular crystals of phosphate of lime, etc., etc. Mr. Giraud found also that warmth assists the formation of the pollen-tubes.

In the 'Botanical Register'† is a note on the appearance of amylum on the surface of the pollen grains of *Polemonium cœruleum*, the formation of which is derived from the primitive cells (Mutterzellen). [The presence of amylum, if it be really true, can only be considered as an exception to the rule and as unimportant, for it is by no means general.—*Meyen*.]

At the meeting of Naturalists at Freiburg M. A. Braun‡ made known his observations on the arrangement in the bursting of the anthers; he proved that the order in which the anthers open agrees only in few cases with the genetic succession of the stamina, indeed is sometimes just the contrary; but in most cases where a real succession takes place, it stands in no relation to the genesis. From a great number of observations M. Braun draws the following cases, in which the order of the opening of the anthers appears:—

I. Simultaneous opening of all the anthers. II. Cyclous-successive opening, and either in centripetal or centrifugal succession. III. One after the other (gliederweise) successive opening; this takes place, 1. in spiral succession, (*a*.) centripetal or progressive, (*b*.) centrifugal or regressive, (*c*.) from the central region, passing either forwards or backwards, and (*d*.) in a determinate spiral, etc.; or, 2. the opening does not take place in spiral succession. Here it passes regularly from one side of the flower to the other, or in an apparently irregular but still constant succession.

By a communication in M. Mussehl's 'Praktischem Wochenblatte des Neuesten und Wissenswurdigsten fur Landwirthschaft,' etc , 1839, No 41, my attention was drawn to an article in M Riecke's Journal, on "Twofold Ennobling" of fruit-trees Under this name is understood the ennobling of stems or twigs which have been produced from already ennobled stocks, by which means the excellence of the fruit is said to be greatly increased

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* Annals of Natural History, April 1839, p. 127.

† 1839, p. 52.

‡ Flora von 1839, p. 302.

Treffz is said to have made known several instances of this "twofold ennobling" in the 'Taschenbuch fur Natur- und Gartenfreunde' for 1803, from which it appeared that apple-trees which had been twice ennobled were distinguished from trees of the same kind by the excellence of their fruit Currants and gooseberries gave excellent fruit after the first, but more especially after the third and fourth ennobling More striking is the effect of such an ennobling in the case of the apricot and quince the apricot, which has a dry flesh, was planted on a green Reineclaude , the quince, which in its raw state is not eatable, was put on an excellent autumnal bergamot pear Treffz relates of the apricot, that the branch, on account of its excessive luxuriance, only bore fruit in the fifth year, but one as juicy as the Reineclaude, of a more reddish yellow colour and more delicate taste The quince bore fruit in the third year, which became ripe in the beginning of September, and whose flesh, even in this first double ennobling, was much more tender, and free from hard parts

I hereby bring this subject forward, and hope that more experiments may be instituted and that those that have been already made may become more generally known The above observations do not prove the usefulness of the double ennobling, but appear to prove that the nature of the graft is changed by the subject , for bad fruits were grafted on good ones (which is not generally the case), and better fruit was obtained

[To be continued]

XXII —*Notes on Birds* By T C Eyton, Esq , F L S , &c

No 2

Bizeura lobata, Shaw

INTEGUMENTS very thick and strong Tongue large broad and thick, with an appendage at the tip, such as is generally found in Ducks a deep groove down the centre, and two others placed so that their points meet towards the tip, and diverge as they continue backwards, forming a chevron , a lunate groove placed transversely near the middle of the tongue the horns turned backwards The whole length of the lateral margins furnished with feeble bristles intermixed with a few small spines, a little posterior to the centre is a row of strong spines placed transversely The region of the glottis and upper part of the œsophagus are also studded with spines

Trachea of large and nearly uniform diameter throughout, slightly contracted immediately above the inferior larynx rings forming it large and strong furnished with the usual sterno-tracheal muscles, which are rather strong a second pair branch from them to the last ring of the trachea, between which and the upper ring of the bronchiæ is stretched a membrane, which these muscles give the bird the power of rendering tense bronchiæ of moderate length, lungs very large

Œsophagus smallest at the upper extremity and gradually expanding to the proventriculus, where it is double the diameter of the upper end proventriculus scarcely perceptible stomach of moderate size, the epithelium presents a hard and granulated appearance a few fragments of shells mixed with pebbles were found in the stomach

The intestinal canal is of moderate size and length and has its exit from the stomach very near the œsophagus The cæca are long largest and rounded at the extremities, cloaca small, liver bilobed, gall bladder large

	ft	in
Length of intestine, from stomach to cloaca	5	10
Length of cæca	0	6
Length of rectum	0	5
Length of stomach	0	2
Breadth of stomach	0	1½
Greatest diameter of œsophagus near the proventriculus	0	1
Least diameter of œsophagus at the upper extremity	0	0½

Skeleton very strong and heavy particularly the bones of the head Sternum of moderate size, very convex on its lower surface, the posterior margin indented by two moderate-sized lateral fissures, the processes forming their exterior margins continued backwards beyond the central portion of sternum, which has a slight indentation opposite to the extremity of the keel The keel shallow, not continued the posterior margin of the sternum, the inferior edge slightly arched anterior edge scolloped, the inferior extremity, to which the os furcatum is attached, slightly produced forwards beyond the other portions of the sternum

Coracoids of moderate length, strongly articulated with the sternum

Os furcatum arched anteriorly, the rami much flattened transversely

Pelvis long, narrow, broadest posteriorly Dorsal line nearly straight The posterior extremities of the os pubis turned abruptly downwards from their junction with the ischium and bent slightly towards each other Obturator and ischiadic foramina very large and oval the former the longest and narrowest

Ribs strong, broad, continued far backwards, seven true and three false one false one placed anteriorly the other two posteriorly

Vertebræ short strong the lateral processes of the caudal ones much lengthened

Cer 15 Dor 6 Sac 19? Caud 9

The three anterior sacral vertebræ have ribs attached the posterior caudal one is pointed at the extremity

Remarks—The anatomy of the above bird, as might have been expected from its external appearance presents a strong resemblance to the Toti palmate division of Water-birds The trachea is precisely that of a Cormorant, and is also furnished with the same muscles of voice

The tongue and digestive organs resemble those of the sea- or shell-feeding Ducks of the genera *Clangula Melanitta* and *Nyroca* I suspect however that they will be found to come more nearly to *Micropterus*, King, than any other genus, but there at present being no published account of the anatomy of this bird, of course it is merely conjecture

The skeleton may be said generally to resemble the Cormorants and Gannets, with the exception of the head, which approaches very nearly in form to that of *Clangula*

The posterior margin of the sternum resembles that of *Sula* but in being much broader posteriorly than anteriorly it resembles the *Fuligulina* The remainder of this bone resembles very closely that of the Common Cormorant, nearly the only distinction being, that the anterior edge of the keel is not much produced forwards, as in that bird, in which respect it agrees with *Melanitta*

The pelvis with the exception of its being rather broader posteriorly in proportion to its length, is precisely that of a Toti palmate bird

The coracoids, in not being so long as among the Cormorants the os furcatum the wings and leg-bones resemble in every particular those of the Sea ducks

XXIII—*Notices of European Herbaria, particularly those most interesting to the North American Botanist**

[Concluded from p 140]

Besides the herbaria already mentioned there are two others in London of more recent formation, which possess the highest interest as well to the general as to the American botanist viz that of Professor Lindley, and of Mr Bentham Both comprise very complete sets of the plants collected by Douglas in Oregon California and the Rocky Mountains as well as those raised from seeds or bulbs which he transmitted to England of which a large portion have from time to time, been published by these authors Mr Bentham's herbarium is probably, the richest and most authentic collection in the world for Labiatæ and is perhaps nearly unrivalled for Leguminosæ Scrophularineæ and the other tribes to which he has devoted especial attention it is also particularly full and authentic in European plants Professor Lindley s herbarium which is very complete in every department is wholly unrivalled in Orchidaceous plants The genus covers are made of strong and smooth hardware paper, the names being written on a slip of white paper pasted on the lower corner This is an excellent plan as covers of white paper in the herbarium of an active botanist are apt to be soiled by frequent use The paper employed by Dr Lindley is 18½ inches in length and 11½ inches wide, which, as he has himself remarked is rather larger than is necessary, and much too expensive for general use

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* Communicated to Silliman's American Journal by the Author, Dr Asa Gray

The herbarium of Sir William J Hooker at Glasgow is not only the largest and most valuable collection in the world in the possession of a private individual, but it also comprises the richest collection of North American plants in Europe Here we find nearly complete sets of the plants collected in the Arctic voyages of discovery the overland journeys of Franklin to the polar sea the collections of Drummond and Douglas in the Rocky Mountains Oregon and California, as well as those of Professor Scouler Mr Tolmie, Dr Gardner and numerous officers of the Hudson s Bay Company, from almost every part of the vast territory embraced in their operations from one side of the continent to the other By an active and prolonged correspondence with nearly all the botanists and lovers of plants in the United States and Canada as well as by the collections of travellers this herbarium is rendered unusually rich in the botany of this country while Drummond s Texan collections and many contributions from Mr Nuttall and others, very fully represent the flora of our southern and western confines That these valuable materials have not been buried, nor suffered to accumulate to no purpose or advantage to science the pages of the Flora Boreali-Americana, the 'Botanical Magazine the Botanical Miscellany' the Journal of Botany the Icones Plantarum, and other works of this industrious botanist abundantly testify , and no single herbarium will afford the student of North American botany such extensive aid as that of Sir William Hooker

The herbarium of Dr Arnott of Arlary, although more especially rich and authentic in East Indian plants, is also interesting to the North American botanist as well for the plants of the Botany of Captain Beechey s Voyage etc published by Hooker and himself as the collections of Drummond and others all of which have been carefully studied by this sagacious botanist

The most important botanical collection in Paris and indeed perhaps the largest in the world, is that of the Royal Museum at the Jardin des Plantes or Jardin du Roi We cannot now devote even a passing notice to the garden and magnificent new conservatories of this noble institution, much less to the menagerie, the celebrated museum of zoology and anatomy or the cabinet of mineralogy geology and fossil remains, which, newly arranged in a building recently erected for its reception, has just been thrown open to the public

The botanical collections occupy a portion of this new building A large room on the first floor handsomely fitted up with glass cases, contains the cabinet of fruits seeds sections of stems and curious examples of vegetable structure from every part of the known world Among them we find an interesting suite of specimens of the wood and another comprising the fruits or nuts of nearly all the trees of this country both collected and prepared by the younger Michaux The herbaria now occupy a large room or hall, immediately over the former perhaps 80 feet long and 30 feet wide above the galleries and very conveniently lighted from the roof Beneath the galleries are four or five small rooms on each side, lighted from the exterior used as cabinets for study and for separate herbaria, and above them the same number of smaller rooms or closets occupied by duplicate and unarranged collections The cases which contain the herbaria occupy the walls of the large hall and of the side rooms Their plan may serve as a specimen of that generally adopted in France The shelves are divided into compartments in the usual manner, but instead of doors the cabinet is closed by a curtain of thick and coarse brown linen kept extended by a heavy bar attached to the bottom which is counterpoised by concealed weights and the curtain is raised or dropt by a pulley Paper of a very ordinary quality is generally used, and the specimens are attached either to half sheets or to double sheets by slips of gummed paper or by pins or sometimes the specimen itself is glued to the paper Genera or other divisions are separated by interposed sheets having the name written on a projecting slip

According to the excellent plan adopted in the arrangement of these collections which is due to Desfontaines three kinds of herbaria have been instituted, viz 1 The general herbarium 2 The herbaria of particular works or celebrated authors, which are kept distinct the duplicates alone being distributed in the general collection 3 Separate herbaria of different countries which are composed of the duplicates taken from the general herbarium To these new accessions from different countries are added which from time to time are assorted and examined and those required for the general herbarium are removed to that collection The ancient herbarium of Vaillant forms the basis of the general collection the specimens, which are all labelled by his own hand, are in excellent preservation, and among them plants derived from Cornuti or Dr Sarrasin, may occasionally be met with This collection augmented to many times its original extent by the plants of Commerson Dombey Poiteau, Leschenault, etc , and by the duplicates from the special herbaria probably contains at this time thirty or forty thousand species Of the separate herbaria, the most interesting to us is that made in this country by the elder Michaux from whose specimens and notes the learned Richard prepared the Flora Boreali-Americana '

Michaux himself although an excellent and industrious collector and observer, was by no means qualified for authorship, and it is to L C Richard that the sagacious observations and the elegant, terse and highly characteristic specific phrases of this work are entirely due

There is also the very complete Newfoundland collection of La Pylaie comprising about 300 species, and a set of Berlandier's Texan and Mexican plants, as well as numerous herbaria less directly connected with North American botany, which we have not room to enumerate. Here however we do not find the herbaria of several authors which we should have expected. That of Lamarck, for instance, is in the possession of Professor Rœper at Rostock, on the shores of the Baltic; that of Poiret belongs to Moquin-Tandon of Toulouse; that of Bosc, to Professor Moretti of Pavia; and the proper herbarium of the late Desfontaines which, however, still remains at Paris, now forms a part of the very large and valuable collections of Mr. Webb. The herbarium of Mr. Webb, although of recent establishment, is only second to that of Baron Delessert; the two being by far the largest private collections in France, and comprising not only many older herbaria, but also, as far as possible, full sets of the plants of recent collectors. The former contains many of Michaux's plants (derived from the herbarium of Desfontaines), a North American collection sent by Nuttall to the late Mr. Mercier of Geneva, a full set of Drummond's collections in the United States and Texas, etc. The latter also comprises many plants of Michaux, derived from Ventenat's herbarium, complete sets of Drummond's collections, etc. But a more important because original and perhaps complete set of the plants of Michaux is found in the herbarium of the late Richard, now in the possession of his son, Professor Achille Richard, which even contains a few species that do not exist in the herbarium at the Royal Museum. The herbarium of the celebrated Jussieu, a fine collection which is scrupulously preserved in its original state by his worthy son and successor Professor Adrien Jussieu, comprises many North American plants of the older collectors, of which several are authentic for species of Lamarck, Poiret, Cassini, etc.

The herbarium of DeCandolle at Geneva, accumulated throughout the long and active career of this justly celebrated botanist and enriched by a great number of correspondents, is surpassed by few others in size, and by none in importance. In order that it may remain as authentic as possible for his published works, especially the 'Prodromus,' no subsequent accessions to families already published are admitted into the general herbarium, but these are arranged in a separate collection. The proper herbarium, therefore, accurately exhibits the materials employed in the preparation of the 'Prodromus,' at least so far as these were in Professor DeCandolle's own possession. As almost twenty years have elapsed since the commencement of this herculean undertaking, the authentic herbarium is of course much less rich in the earlier than in the later orders. The Compositæ, to which seven years of unremitted labour have been devoted, form themselves an herbarium of no inconsiderable size. It is unnecessary to enumerate the contributors to this collection (which indeed would form an extended list), since the author, at least in the later volumes of the 'Prodromus,' carefully indicates as fully as the work permits the sources whence his materials have been derived. The paper employed is of an ordinary kind somewhat smaller than the English size, perhaps about fifteen inches by ten and the specimens are attached to half-sheets by loops or slips of paper fastened by pins so that they may readily be detached if necessary for particular examination Several specimens from different sources or localities or exhibiting the different varieties of a species are retained when practicable and each species has a separate cover with a label affixed to the corner containing the name, and a reference to the volume and page of the ‘Prodromus where it is described The limits of genera sections tribes etc are marked by interposed sheets with the name written on projecting slips The parcels which occupy each compartment of the well-filled shelves are protected by pieces of binder s board, and secured by a cord, which is the more necessary as the cases are not closed by doors or curtains

The royal Bavarian herbarium at Munich is chiefly valuable for its Brazilian plants, with which it has been enriched by the laborious and learned Martius The North American botanist will, however, be interested in the herbarium of Schreber which is here preserved and comprises the authentic specimens described or figured in his work on the Grasses, the American specimens mostly communicated by Muhlenberg The Gramineæ of this and the general herbarium have been revised by Nees von Esenbeck and still later by Trinius It was here that the latter who for many years had devoted himself to the exclusive study of this tribe of plants and had nearly finished the examination of the chief herbaria of the Continent, preparatory to the publication of a new ‘Agrostographia,’ was suddenly struck with a paralysis, which has probably brought his scientific labours to a close

The imperial herbarium at Vienna, under the superintendence of the accomplished Endlicher, assisted by Dr Fenzl, is rapidly becoming one of the most valuable and extensive collections in Europe The various herbaria of which it is composed have recently been incorporated into one which is prepared nearly after the English method It however possesses few North American plants except a collection made by Enslin (a collector sent to this country by Prince Lichtenstein, from whom Pursh obtained many specimens from the Southern States), and some recent contributions by Hooker etc There is also an imperfect set of the plants collected by Hænke (a portion of which are from Oregon and California), so far as they are yet published in the Reliquiæ Hænkeanæ’ of Presl in whose custody as curator of the Bohemian museum at Prague the original collection remains

The herbarium of the late Professor Sprengel still remains in the possession of his son Dr Anthony Sprengel, at Halle, but is offered for sale It comprises many North American plants, communicated by Muhlenberg and Torrey The herbarium of Schkuhr was bequeathed to the University of Wittemberg, and at the union of this university with that of Halle was transferred to the latter, where it remains under the care of Professor Von Schlechtendal It contains a large portion of the *Carices* described and figured in Schkuhr s work, and is therefore interesting to the lovers of that large and difficult genus. The American specimens were mostly derived from Willdenow, who obtained the greater portion from Muhlenberg.

The royal Prussian herbarium is deposited at Schoneberg (a little village in the environs of Berlin), opposite the royal botanic garden and in the garden of the Horticultural Society. It occupies a very convenient building erected for its reception, and is under the superintendence of Dr Klotzsch, a very zealous and promising botanist. It comprises three separate herbaria, viz. the general herbarium, the herbarium of Willdenow, and the Brazilian herbarium of Sello. The principal contributions of the plants of this country to the general herbarium, garden specimens excepted, consist of the collections of the late Mr Beyrich, who died in Western Arkansas while accompanying Col. Dodge's dragoon expedition, and a collection of the plants of Missouri and Arkansas by Dr Engelmann, now of St Louis, to which a fine selection of North American plants, recently presented by Sir William Hooker, has been added. The botanical collections made by Chamisso, who accompanied Romanzoff in his voyage round the world, also enrich this herbarium; many are from the coast of Russian America and from California, and they have mostly been published conjointly by the late Von Chamisso and Professor Schlechtendal in the *Linnæa*, edited by the latter.

The late Professor Willdenow enjoyed for many years the correspondence of Muhlenberg, from whom he received the greater part of his North American specimens, a considerable portion of which are authentic for the North American plants of his edition of the 'Species Plantarum.' In addition to these we find in his herbarium many of Michaux's plants, communicated by Desfontaines, several from the German collector Kinn, and perhaps all the American species described by Willdenow from the Berlin garden. It also comprises a portion of the herbarium of Pallas, the Siberian plants of Stephen, and a tolerable set of Humboldt's plants. This herbarium is in good preservation, and is kept in perfect order and extreme neatness. As left by Willdenow, the specimens were loose in the covers, into which additional specimens had sometimes been thrown, and the labels often mixed, so that much caution is requisite to ascertain which are really authentic for the Willdenovian species. To prevent further sources of error, and to secure the collection from injury, it was carefully revised by Professor Schlechtendal while under his management, and the specimens attached by slips of paper to single sheets, and all those that Willdenow had left under one cover as the same species, are enclosed in a double sheet of neat blue paper. These covers are numbered continuously throughout the herbarium, and the individual sheets or specimens in each are also numbered, so that any plant may be referred to by quoting the number of the cover and that of the sheet to which it is attached. The arrangement of the herbarium is unchanged, and it precisely accords with this author's edition of the 'Species Plantarum.' Like the general herbarium, it is kept in neat portfolios, the back of which consists of three pieces of broad tape, which, passing through slits near each edge of the covers, are tied in front, by this arrangement their thickness may be varied at pleasure which, though of no consequence in a stationary herbarium, is a great convenience in a growing collection The portfolios are placed vertically on shelves protected by glass doors and the contents of each are marked on a slip of paper fastened to the back The herbaria occupy a suite of small rooms distinct from the working rooms which are kept perfectly free from dust

Another important herbarium at Berlin is that of Professor Kunth which is scarcely inferior in extent to the royal collection at Schoneberg but it is not rich or authentic in the plants of this country It comprises the most extensive and authentic set of Humboldt s plants and a considerable number of Michaux s, which were received from the younger Richard As the new Enumeratio Plantarum' of this industrious botanist proceeds this herbarium will become still more important

For a detailed account of the Russian botanical collections and collectors we may refer to a historical sketch of the progress of botany in Russia etc by Mr Bongard the superintendent of the Imperial Academy s herbarium at St Petersburgh published in the Recueil des Actes of this institution for 1834 An English translation of this memoir is published in the first volume of Hooker s Companion to the Botanical Magazine' A G

XXIV —Excerpta Botanica, *or abridged Extracts translated from the Foreign Journals, illustrative of, or connected with, the Botany of Great Britain* By W A Leighton, Esq, B A, F B S E, &c

No 6 *On the Development of the Reproductive Organs of the Misseltoe* (Viscum album, *Linn*) By M Decaisne (Ann des Sci Nat n s xiii p 292)*

The male flower of the Misseltoe begins to be visible for nearly a year before its expansion The anther is then not distinguishable from the green calyx by which it is embraced, except by the absence of colour, being formed of cellular tissue, the meshes of which are of similar form and dimensions Somewhat later, in this interior and colourless portion, are formed many lacunæ, which apparently result from the destruction of the cellular tissue over these points, and which become filled with a mucilaginous fluid A little later still, this mucilage is observed to be composed of utricules, with soft, very thin and transparent walls, considerably larger than the utricules of the adjacent parts, and connected solely by a viscous fluid At this time the anther is constituted of three kinds of cellules, viz the primitive colourless cellules, which still form the greater portion of the mass, other cellules, of a grey or yellow colour, in the vicinity of the lacunæ, of which they constitute the walls, and chiefly remarkable by the presence of a central nucleus, and those larger cellules which fill the lacunæ, and which are identical with the utricules termed *polliniferous* by Mirbel

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* [Prof Meyen s remarks on this paper will be found at p 169 of the present Number —Ed]

These transparent utricules soon become obscured by the presence of numerous granules, in the midst of which are observed one or two bodies, likewise granular, but considerably larger, which we shall term nuclei (*noyaux*) These granules become gradually collected into a single mass in the centre of the utricule, which is thus rendered more opake in the centre, though still transparent through the increased thickness of its circumference This mass may with care be abstracted entire from the cavity in which it is enclosed, when the nuclei will be found united, and at the end of some days four may be distinguished

After the lapse of some time we perceive nothing more than these nuclei, the absorbed granules having disappeared The nuclei are only separated by matter which at first is fluid, but subsequently becomes solidified, and their form is that of so many separate cells During this same time, this matter becomes equally solidified on the interior walls of the utricule, so as to form a thickening, which is apparently the result of many successive layers, and its transparence becomes altered Such is the state of the anther about four months after the appearance of the bud, when it exhibits on its internal face a considerable number of small cells, which are merely closed by the epidermis which extends over their apertures In each of these cells are pollinic utricules, with thick succulent walls, marked with concentric zones, their internal cavity divided by thinner walls into four still smaller cavities, containing as many granular nuclei, which, on the rupture of their envelope under water, escape

These latter nuclei continue to grow, become round and invested with a yellow papillose integument, and with their growth the walls and divisions of the utricules gradually diminish and finally disappear, when the nuclei of the different utricules are found all free together in the common cavity previously occupied by the polliniferous utricules, in short, they become so many grains of pollen in one of the cells of the anther From this time these grains assume that external appearance which they ever afterwards retain, although not yet arrived at their complete development, which still goes forward in their interior If by a slight pressure we burst one of them, the nucleus issues forth, together with numerous scattered granules, from the external envelope, which is bristled over with minute asperities. When the grain is completely matured, a similar pressure causes the protrusion, from the same envelope, of a vesicle, which, on being itself burst, emits a multitude of granules, but there is no appearance of a nucleus.

On reviewing the above series of changes, we perceive that the formation seems generally to proceed from the exterior towards the interior, seeing that the vesicles are organized and filled with granules, in the midst of which are observed many centres (*moules*), which, to the number of four, associate or absorb the rest of the granules, that these vesicles become thickened by the formation of successive layers more and more internal, and are divided by their interposition between the granular centres, that these centres are invested with a primary envelope, which is finally lined on the inside by a final membrane, which immediately encloses the granules. These different parts are not co-existent, the older ones disappearing first, and probably furnishing the materials for the more recent, of which, in other respects, they do not constitute a part.

These observations accord both with those which are considered the most complete and certain on the formation of tissues, as well as with those which relate more particularly to the formation of pollen. To this latter phenomenon they contribute many new facts, such as the presence of these nuclei, the primary germs of the pollinic grains, the deposition of many successive layers on the walls of the mother utricule, and the instantaneous formation of divisions to which they themselves conduce, the origin of the proper envelope of the pollen.

In most other plants, when pollen arrives at maturity, some peculiar change takes place in the cellules constituting the internal walls of the cell, whose zones become thickened, and are finally divided into elastic filaments, whose play determines the dehiscence of the anther. Nothing similar to this takes place in the Misseltoe, whose anther can be scarcely said to be dehiscent, inasmuch as its cells are externally open. Moreover, the cellules composing its wall continue in the state above described, their component membrane being persistent, and of uniform thickness.

Nearly at the same time when the pollen has attained perfect maturity, the female flower is expanded, and the pollinic action is then for the first time able to take effect upon the newly-disclosed stigma. Nevertheless, the most delicate observation has failed to detect the ovulum either at this period or for a long time after, in the minute flower, the tissue of the calyx, and that of the ovary in the centre agglutinated to it, being only visible, and a little later, in the interior of this ovary, at first plain, two small lacunæ are seen, which finally enlarge, unite, and form one cell with contiguous walls

It is not until more than three months later that there is perceived at the bottom of this compressed cavity a very small, cone-shaped, pulpy body, accompanied by one or two still smaller club shaped filaments These are so many erect ovula, in two of which there is generally the commencement of abortion They are composed of utricules superposed in circles, which in the ovulum to be developed are few in number, and in the abortive ovula are even reduced to a single one In these utricules are a nucleus, and very numerous and minute grains of fecula

The ovulum, on its appearance, increases rapidly, and after some days a small spot is detected towards its summit, which indicates the embryo The development of this embryo, from its first appearance to maturity, has been observed by M Decaisne, and is similar to that of other Dicotyledons

It is different, however, with the body surrounding the ovulum In general, as is well known, the ovulum is formed of many envelopes, enclosed one within the other, one or two of those most exterior being open at their summits, and the two innermost perfectly closed

But M Decaisne has been unable to discover in the ovulum of the Misseltoe any corresponding opening at the summit, and he has been led to conclude that the exterior envelopes (primine and secundine) are absent, and that the ovulum is a naked nucleus He has moreover ascertained this nut to be composed of a homogeneous tissue throughout its whole thickness, which immediately embraces the embryo, and hence deduces the non-existence of a quintine or embryonic sac It is in reality an ovulum reduced to its simplest expression, a sac enclosing the embryo This sac thickens and solidifies as it grows, and forms a perisperm, the colour of which, being green, is unique among the families of plants M Decaisne has followed the progress of this colouring, which extends progressively from the base to the summit, he has seen, in the cellules of the nut, besides the nucleus and the grains of fecula by which at first it was exclusively filled, numerous green granules, which mingle with, but do not cover, the others, and he has thus observed this to be the process of the green tint in the vegetable tissues

Another anomaly in the seed of Misseltoe is the plurality of embryos This plurality is not rare in a great many plants, being accidental in the greater number, though always constant in some Ordinarily it occurs in seeds destitute of perisperm, but when this perisperm is also present, the embryos are pressed together at the same height, or at slightly different heights This, however, is not so in the Misseltoe, for the embryos, two, or more rarely three in number, all touch each other by their lower extremities, and diverge at their upper or radicular extremities, which are distant, and separated by a portion of the perisperm, from which they slightly project

M Decaisne's discovery of many ovula in the bottom of each ovary leads to the most natural explanation of this phenomenon In a great number of cases, two of these ovula are abortive, and then a single embryo only is found in the mature seed, but in other instances, two, or even three ovula, being fertilized, are developed and united by their bases, and then we have so many embryos diverging at their summits

The results of this theory are, that it reduces the many apparent anomalies of the Misseltoe to a single real one, the unity of the ovular envelope, and thus restores the development of its seeds to known laws It also effaces in part the difference between the ovular covering in the European Misseltoe and that of the Indian species noticed by Mr Griffith, and in which three ovula are detected in each cell on a central support Our Misseltoe thus forms a transition between them and *Loranthus*, in which the ovulum is really single and erect

M Decaisne has added to his memoir an examination of the anatomical structure of the stem A young branch exhibits in its centre a green pith, surrounded by a case formed of woody bundles, generally eight in number In these bundles we find no tracheæ, but nearly in the situation which they should occupy, only annular vessels These, together with the elongated and pointed, or reticulated cellules, and the fibres analogous to those of the liber, constitute the whole vascular system of the plant, which is besides composed of utricules, in which abound, together with granules of starch, granules of green matter Outside, and opposite to the woody bundles, are as many smaller ones, formed exclusively of fibres of liber, and which may therefore be termed *cortical* The woody bundles are continued from one branch into another, whilst the cortical bundles are interrupted, after being attenuated, at each joint, whence results the facility with which the branches are disarticulated

XXV —*On the Origin of some of the Lower Forms of Vegetation* By Mr Henry Oxley Stephens

To the Editors of the Annals and Magazine of Natural History

Gentlemen,

No one ever directed his attention to the œconomy of the lower forms of vegetation without soon arriving at the highly interesting but perplexing problem of their origin and reproduction No question in vegetable physiology is of higher moment than this, none surrounded by greater difficulties, and in none is the inquirer more prone to error than in attempting conclusions from the negative facts (if the term is admissible) with which he has to deal The obscurity in which, from its very nature, the subject is involved, is so dense, that many physiologists avoid it altogether as hopeless, considering it to be beyond human intelligence, whilst, on the other hand, some rash speculators, drawing inferences which the doubtful premises cannot warrant, descend at once into the profound of materialism *, and do not hesitate to intrude with unholy footsteps within the sacred precincts of forbidden ground Nevertheless, the origin of the lower tribes of Fungi (for it is to these alone this paper refers) is a question as open to discussion, and as fit for investigation, as any other point of Natural History There is no perfect Fungus which is not furnished in some part with an apparatus which bears certain minute bodies called sporidia, having some degree of resemblance to the reproductive bodies (sporules) of Ferns, Mosses and Hepaticæ, which last are well known to produce their like kinds by a process analogous to the germination of seeds It has been assumed (and indeed generally admitted, though I am not aware directly proved) that these sporidia are the seeds of Fungi, producing by cryptogamic germination the same species as the parent plant, whilst other physiologists, admitting the sporidia to be capable of continuing the species, do not consider this to be the only method, or as indeed at all adequate to account for the production of Fungi in certain situations

This is the question we are about to discuss It is argued in behalf of propagation by spores, that these bodies, which are produced in such numbers as to be beyond all estimate, must have a definite office to perform, and that from their peculiar lightness, they are, as soon as shed from the hymenian of the parent plant, wafted through the air, and thus distributed to almost any distance Whilst I admit the spores to be the reproductive bodies, I dissent from the latter conclusion, which seems very doubtful, as far as observation will carry us in this difficult subject I am inclined to think the spores of Agarics at least are not generally disseminated far from the spot on which the plant which produced them grew

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* [It does not seem clear in what sense our Correspondent employs this term —Ed]

I have always found Agarics which bear spores of a colour easily seen, the *Leucosporidia* for instance, shed them underneath the pileus, and that the grass, &c is covered with the spores only immediately around and beneath the plant, to which they adhere, and are not blown away as soon as shed It will be said this must necessarily depend upon the atmosphere, whether the air is still or not, but the generality of Agarics lie very close to the ground, and the expansion of the pileus, extended like an umbrella, must, I think, even in windy weather, prevent any great current of air from passing under it Perhaps this will be thought over-refined reasoning, but the following facts seem to countenance it Particular species appear annually on the same spot of ground, and do not wander away from it, thus *Ag nebularis,* Batsch, grows every autumn at one corner of Leigh Down, and does not spread from this locality *Ag personatus,* Fries, I have seen every autumn in the same situation for several years *Ag oreades* grows in eccentric circles, one circle exteriorly to that of last season, which would scarcely be the case if the sporules of this species were scattered about by the wind, but single individuals do occasionally occur no doubt *Ag oreades* is propagated in these circles by underground mycelia, but this circumstance does not affect the argument The stump of a tree immediately under a plant of *Polyporus igniarius* will be seen densely dusted with sporules, showing that these fall near the spot occupied by the parent plant It would be easy to multiply instances of the regularity with which Fungi appear in the same spot, but these are enough, and from them I infer that the dissemination of the spores of Fungi through the medium of the atmosphere has been greatly over-estimated Taking into account the number of species of Fungi, and the great quantity of sporidia which each plant gives out, it seems to me the atmosphere must contain so many, that they would certainly be detected in it before this time, and yet none have ever been observed The method of making what is called mushroom-spawn is too well known to need description, and every exhausted hot-bed will produce plants of *Ag campestris* how did the germs of these plants get there? It is answered, through the air this has been considered before, besides, the mycelia will be found in the com-post, several feet below the surface But the spores were introduced with the horse-dung, true, but this is produced by stabled horses fed on hay, and the *Ag campestris* does not grow in mowing grass, nor in the hay-making season, and the hay could scarcely contain such abundance of spores, besides, is it probable such minute and delicate bodies would pass through the digestive process of the animals' intestines entirely unaltered? It may be answered, oats frequently do, but the two cases are not alike There is every reason for believing Fungi are produced from spores the circumstance of exotic species appearing in foreign mould *e g Aseroe rubra*, La Billardière, in earth from New Holland, seems to prove this, but to conclude they are invariably so produced, appears to me to be assuming much more than we really know, and that in the face of circumstances which render the reverse very probable

In support of the hypothesis of the invariable origin of Fungi from spores, it is stated that wheat selected from specimens infected with *Uredo caries*, when sown, produces a bunty crop This is scarcely a satisfactory argument, for such wheat may possess the tendency to this disease without being actually impregnated with the spores, just as we know the finest samples of wheat from hot climates produce mildewy crops when sown in our more cold and changeable latitude, besides, the experiments of Sir J Banks with wheat sprung from sources infected with *Puccinia graminis* led to an opposite conclusion It may be advanced, that wheat growing near Barberry bushes is rendered mildewy by infection from the parasitic Fungus frequently abounding on those trees, but the Barberry parasite is an *Æcidium*, whilst the plagues of wheat are always *Pucciniæ* or *Uredines* The greatest difficulty is in the erumpent Fungi, how could they reach the situations in which they vegetate? It may be said precisely the same question arises in Zoology, and the arguments which apply to *Entophytes* will apply to *Entozoa*, this is only advancing a counter-difficulty, and the solution of one problem would probably explain the other *Entophytes* must have their origin in one of the following methods their spores must be introduced into the parent plant, and there, finding a suitable nidus and circumstances favourable for their growth, commence their proper vegetation, or the structures in which they grow must, under favourable conditions, have the power or quality of originating them out of their own organization

There are difficulties in the way of both these theories Of the first, the question arises, how are they introduced into the parent plant? There appears to be only two ways, either by the spongioles of the roots, or through the stomates of the leaves As far as our knowledge of the physiology of the spongioles extends, it seems improbable that they have the power of absorbing solids (for earths, etc , as silica, are absorbed in a state of solution), even when as minute as sporidia, nor does our imperfect acquaintance with the course of the sap enable us to say, that along with it innumerable spores can pass the long journey from the roots of an oak or pine tree to the leaves, this would be altogether an unproved assumption

Besides, if these sporidia passed through the vascular tissue of plants, of late years these structures have been examined with such scrupulous and scrutinizing care through the most powerful microscopes, I should have conceived a stray spore must have been observed before this time, and yet none have ever been seen, simply, I presume, because there are none there to see But they may be absorbed through the stomates into the leaves, and carried down along with the woody fibres, which, according to the theory of Du Petit Thouars, the leaves annually form It is first necessary to prove the openings of the stomates are large enough to allow the sporidia to pass through them If a sporidium of *Uredo* or *Puccinia* is a single plant reduced to the most simple condition, and not admitting of further subdivision, it is too large to find access to the external structure of the leaf through the orifices of the stomates, but it may be said the grumous contents of the sporidia of *Puccinia* and *Uredines* are prolific, and can pass through the stomata In our present state of ignorance on this obscure subject, we can neither prove nor disprove this point, and I would wish to state every argument as fairly as I am able Evergreens, which have thick coriaceous leaves and a horny cuticle, are well known to be very scantily supplied with stomates, and yet such leaves are prolific of entophytous Fungi, *e g* the leaves of Lauro cerasus, holly and ivy, this is a negative argument against the introduction of spores through the exhalent orifices

It is easy to produce some erumpent Fungi, you have only to break a living twig of oak so as to cause it to wither and die, leaving it attached to the tree, and *Cenangium quercinum* will appear beneath the bark Now if this Fungus arises from spores already contained in the tree, and only waiting for the death of the twig to assume an active state of vegetation, the whole of the branches of the tree must be impregnated with countless multitudes of the spores of *Cenangium* (not to say of many other Fungi), which is an assumption for which we have not the slightest shadow of evidence There is scarcely a stick that died in the autumn, which is not, on the approach of winter, densely covered with *Tubercularia vulgaris*, there is no proof, when the stick was living, that the spores of this plant remained dormant within its cellular tissue

It must be recollected that, admitting the hypothesis of the absorption of spores, the earth or air must be impregnated with them in countless myriads, and these most delicate globes or cells must possess a most extraordinary power of resisting putrefaction, and in the case of *Cenangium* preserve their vitality through an incredible space of time when imprisoned in the solid structure of the oak-tree, and yet the origin of Fungi, which are parasitic upon Fungi, according to the theory of their invariable production from spores, is still more inexplicable The elegant little *Ag Loveanus*, Berk, has its origin within the substance of the pileus of *Ag nebularis*, Batsch, and bursts through the cuticle of the pileus of the latter plant Now the parent plant is altogether cellular, having neither vessels or tubes of any kind through which we can suppose the spore, which gave origin to the *Ag Loveanus*, could be transmitted

I do not know how this can be explained according to the theory of absorption of spores contained in the earth

The other theory is, that the structures which contain erumpent Fungi must, under certain favourable circumstances, have the power or quality of originating these plants out of their own organization Inclined as I am to suppose some of the lower forms of vegetation may obtain their existence out of the ruins of the higher, according to certain definite laws imposed by the great Author of all things, which laws are to us altogether unknown, I should be sorry to be thought to be an advocate of the doctrine of what is called spontaneous generation, in plain language, things making themselves, it is too absurd to need disproof, or of equivocal generation, for nature emerged too perfect from the hands of her Creator to have anything doubtful or equivocal in any of her processes These processes may *seem* doubtful or equivocal to us, simply because they are beyond our comprehension Of the truth of the last theory of production of imperfect plants, it must be admitted there is no direct proof, it must rather be inferred from the difficulties and objections which have been advanced against the former It is generally assumed by those who accept the latter theory, that out of the departing vitality of some higher organized vegetable (for I have considered the question throughout as referring to vegetable life only) a lower degree of life and organization may arise, like the fabled Phœnix, from ashes, and thus the simpler forms of vegetation may derive their origin from the upper, but it must be admitted there are objections to this assumption, and those not of theory and speculation, but of fact and experience Many erumpent Fungi have not their origin in dying vegetable matter, but in substances which have long lost all vitality, and therefore can part with none to the parasites which infest them,—*Sphæria entypa*, for example, which grows within the substance of wrought wood, such as posts and rails, the origin of which cannot be explained satisfactorily according to the latter theory of the production of imperfect vegetables The whole subject is as interesting as obscure, and it is possible that an observer who had time and leisure for tracing, with the assistance of a microscope of sufficient power, the growth of some Fungus of the lowest organization, such as *Tubercularia*, might arrive at the ultimate point of its origin, and be enabled to decide whether it had its being from a metamorphosis of the organized structure of the parent plant, or sprung from a spore, and derived its nutriment only from the material in which the germ of the parasite was previously deposited

HENRY OXLEY STEPHENS

Terrell Street, Bristol March 12, 1841

XXVI —*An Amended List of the Species of the Genus* Ovis

By EDWARD BLYTH, ESQ *

THE arrival of various spoils of different species of wild sheep since my memoir upon this genus of animals was read before the Society enables me now to clear up several points which I formerly left as doubtful, as well as to include some additional species in the catalogue, and to indicate still more as probably distinct and therefore desiderata to which the attention of travellers and others should be directed

1 *Ovis Poli* nobis (the Pamir Sheep) In the narrative of the celebrated Venetian traveller Marco Polo we read (in Marsden's edition p 142) that upon the elevated plain of Pamir, eastward of Bokhara, and which is 16,000 feet above the sea level, " wild animals are met with in great numbers, particularly sheep of a large size, having horns three, four and even six palms in length The shepherds form ladles and vessels of them for holding their victuals

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* Read before the Zoological Society, July 28, 1810 The notes, bringing the subject up to the present state of information, are now added by the author for publication in this work

They also construct fences for enclosing their cattle, and securing them against the wolves with which they say the country is infested, and which likewise destroy many of the wild sheep or goats (*moutoni e becchi* or 'boucs) More recently an animal called the *Rasse* was indicated from report in Sir Alexander Burnes's Travels in Bokhara, ii 208, and its horns have since been transmitted to the Royal Asiatic Society by Lieut Wood of Sir A Burnes's party through the medium of G T Vigne, Esq * In this magnificent specimen of a frontlet I recognize (though with some hesitation) the *Ovis sculptorum* formerly described by me from a horn in the Museum of the Royal College of Surgeons, but as the characters of that specimen as originally drawn up by me, have not hitherto been published as its flexure too which suggested the appellation of *sculptorum*, would appear to form a less extended spiral than is probably normal and the habitat also proves to be different from that anticipated —namely the Taurus, which I have still reason to suspect contains a large undescribed species of this genus ,—I here propose to dedicate the present splendid animal to the illustrious Venetian traveller of the thirteenth century by the name of *Ovis Poli*

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* This pair of horns was labelled "*Rass*, or *Roosh*, and Sir A Burnes writes—"I heard of an animal called *Rasse* by the Kirghizes, and *Kooshgar* by the inhabitants of the low countries, but Lieutenant Wood (in the narrative of his 'Journey to the Source of the Oxus,' p 368) distinguishes between the "*Rass*" and "*Kutch gar*,' the former "having straight spiral horns, and its dun colour being of a reddish tinge Mr Vigne is of opinion that this animal is no other than the *Markhur* (p 155), which he tells me is found upon the hills of Budukshan, and which I consider to be a feral race of domestic Goats of remarkably large size, but otherwise not essentially differing from the Shawl Goat of the same countries Of a specimen of the "*Kutch-gar*, or Wild Sheep, Lieut Wood remarks—"It was a noble animal, standing as high as a two year old colt [Kirghiz Pony ?], with a venerable beard and two splendid curling horns, which, with the head, were so heavy as to require a considerable exertion to lift them Though in poor condition, the carcass, divested of its offal, was a load for a baggage pony Its flesh was tough and ill-tasted, but we were told that in autumn, when the animal is in prime condition, no venison is better flavoured The *Kutch gar* is gregarious associating in herds of several hundreds They are of a dun colour, the skin more resembling the hide of a cow than the fleece of a [tame] sheep A skeleton of this animal, and several complete crania, were deposited, I believe, at Indiana This traveller confirms the statement of Marco Polo, mentioning that—"We saw numbers of horns strewed about in every direction, the spoils of the Kirghiz hunter Some of these were of an astonishingly large size * * * The ends of these horns, projecting above the snow, often indicated the direction of the road, and whenever they were heaped up in large quantities, there our escort recognized the site of a Kirghiz summer encampment This was at 14,400 feet above sea level It is curious that the Kirghizes shoe their horses with, and make stirrups from, the horns of this animal 'The shoes are nothing more than a semicircular piece of horn placed on the fore part of the hoof When the horse is in constant work, it requires renewal at least once a week Burnes 'was told that the *Rasse* is larger than a cow and less than a horse, of a white colour, with pendent hair under the chin * * * The flesh is much prized by the Kirghizes, who hunt and shoot the animal with arrows It is said to delight in the coldest climates, and a common-sized specimen will require two horses [Kirghiz Ponies] to bear its flesh from the field The appellation *Rasse*, it may be remarked, is likewise bestowed on a small species of Civet, the *Viverra Rasse*, Horsfield, or *V Indica*, Is Geoff, but not of British authors —E B

As compared with the Rocky Mountain Sheep of North America the *Rass* or *Roosh* of Pamir differs in having the horns considerably less massive, but more prolonged, approaching more in character to those of the domestic *O Aries* but differing again from the latter not only in their very superior size, but in having their two front angles about equally developed As in the Rocky Mountain species, and I believe also the *O Aries* normally the pair at first diverge backward and then descend and gyre round at a parallel with the axis of the body, inclining as they again spire backwards more outward to the tip The horns described were in their seventh year of growth and measure 4 feet 8 inches in length following the curvature and $14\frac{1}{4}$ inches round at base, having the tips which are continued round till they point obliquely backwards 45 inches apart The width of their upper plane is $3\frac{1}{2}$ inches at base, $2\frac{1}{4}$ inches at the distance of one foot from the base, and $2\frac{1}{2}$ inches at 2 feet distance from the base, the depth of the base inside is 5 inches, and distance apart of the pair, measured outside where they gyre forward at a parallel 21 inches The years of growth are successively $15\frac{1}{2}$ $10\frac{1}{2}$ 13, 8, 5, 3, and the last (incomplete) 1, inches The College of Surgeons' specimen, a single horn, was in its eighth year of growth but measures only 4 feet 4 inches round the curvature its depth towards the base is 6 inches, and greatest width, about the middle $2\frac{3}{4}$ inches The successive annual growths are $12\frac{1}{2}$ 9 8 8 7 5 $3\frac{1}{2}$ and the incipient eighth 1, inches It is curved in a spiral involution and scarcely outwards for three fifths of a circle when it gradually inclines more so to the tip the horn describing one circle and about a third When upon the head, it must accordingly have gyred considerably inward, instead of descending at a parallel with the other as indeed is almost invariably the case with the domestic *O Aries* Both specimens are of a pale colour, and indented with rugged transverse striæ, in general half an inch apart Of the animal nothing further is yet known Considering indeed the differences of the two specimens it is by no means improbable that they will yet prove to be of allied rather than of the same species, in which case my former name of *O sculptorum* might be retained for that to which it was applied

2 3 and 4 The museums of Western Europe do not, that I can learn, contain any portion of the Siberian Argali *Ovis Ammon* of Pallas that might serve for comparison with the Rocky Mountain Sheep of North America *O montana* of Desmarest, but as the Kamtschatka Argali is described as a distinct species, *O nivicola*, by M Eschscholtz in his Zoologischer Atlas ' (differing from the two preceding in its inferior size and in wanting it would appear, the pale disc surrounding the tail, so conspicuous in both the others,) the probability is thus enhanced, that the Siberian and Rocky Mountain

species are not the same, however closely they may resemble The descriptions of *O Ammon* would seem to apply in every particular to the *O montana*, though it is still probable that actual comparison of specimens would lead to the detection of some discrepancies as generally, but not always, happens in like cases I may notice, that while Mr Drummond affirms that the horns of old rams of *O montana* "attain a size so enormous, and curve so much forwards and downwards that they effectually prevent the animal from feeding on level ground*," the same had previously been remarked by Strahlenberg of the Argalis of Siberia†, and no doubt is equally observable in the *Rass* of Pamir The finest specimen of a head of the Rocky Mountain animal of seven heads of adult males examined, is in the collection of this Society, and gives the following admeasurements horns 3 feet 5 inches over the front ridge, and 17¼ inches round at base, where the front angles are 4¾ inches apart They number nine years of growth, which successively give 9, 7½, 6½, 5, 4½ 4 2¼ 1¼, and 1, inches They are nearly equilaterally triangular, but bulge a little between the angles having the inner or front angle obtusely prominent, the posterior double, or forming a second plane at a slight angle with the superior one and the inferior angle (if such it can be called) much rounded off the greatest depth of the horn is about 6 inches from base of front angle to tip they measure 11 inches, and the tips apart 26 inches They are everywhere strongly furrowed across, more particularly in front, the intervals between the grooves swelling out considerably, and they gradually become as in all the rest of the genus, more compressed to the extremity

Of the *O nivicola* of M Eschscholtz, that naturalist writes 'The specimen described is a male in winter garb, measuring 5 feet (French ?) in total length and 2 feet 5 inches high Its outer coat is of a yellowish grey colour, brighter on the under parts, and inclining to straw-yellow on the head and neck, the markings in front of the limbs are of a rust colour horns equilaterally triangular, 3 inches thick at base, and gyring outwards to form one complete spiral circle, 10 inches in diameter, and having their points directed outwards and forwards, the upper and posterior portions of the horn are level, and marked with deep annual indentations, which successively measure 7 6 5 4 3 2, 2 and 1½, inches, making eight years of total growth besides which there are numerous minor indentations or ordinary cross-striæ, but no protuberant intervals " From the figure they would seem not to bulge between the angles, as is usual, though not invariably the case, with the Rocky Mountain species as also to be somewhat more tensely spiral, as if pulled a little outward The appearance both described and figured at the base of the fore limbs externally, I suspect to be nothing more than the *axilla*, that had been twisted outwards in the mounting of the specimen M Eschscholtz describes this animal to be very nume rous on the mountains of Kamtschatka residing upon the snow clad heights in summer, and descending to the lower regions in winter A notice of its chamois-like agility occurs in the narrative of Kotzebue s Voyage from 1823 to 1826

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* *Fauna Americana borealis*

† Description of the northern parts of Europe and Asia —Eng Transl, p 332

In the 18th volume of the 'Asiatic Researches, part ii , Mr Hodgson, of Nepal gives a figure of a horned female of the Nahoor Sheep, and also of the skull and horns of a young ram, which he erroneously refers to that species, as since described by him He also mentions having once possessed a pair of the horns which he could only lift from the ground with a considerable effort but it is necessary to observe, that the description which he gives in the volume adverted to, of the mutilated skin of a young wild ram, procured in mid winter refers evidently to the Nahoor and not to the species with horns having a triangular section which is the subject of the present notice According to Mr Hodgson the horns of this young specimen are "equilaterally triangular, as the figure likewise represents, whereas the Rocky Mountain species would at the same age have much compressed horns far from attaining to an equilateral triangle Should a true species be here indicated as is not improbable distinct from O *Ammon* I propose that it be dedicated to that assiduous investigator of Nepalese zoology, and be accordingly termed O *Hodgsonii*

5 O *Californiana*, Douglas The Jesuit missionary Venegos observed in California "a kind of wild sheep, the size of a calf of one or two years old, with extraordinarily thick horns, resembling those of a common ram *and tail shorter than that of a stag* whence it would appear that the Rocky Mountain species or a near ally, is here alluded to Mr Douglas describes the Californian Aigali to have a tail 18 inches long (*vide* Zoological Journal iv 332) Its length he observes from nose to base of tail is 5 feet 10 inches height of the shoulder 2 feet 8 inches girth behind the shoulders 6 feet head 16 inches long 7 [to] between the eyes and 9 [to] between the horns ears erect, $1\frac{1}{2}$ inch [$4\frac{1}{2}$ inches ?] long, obtuse The horns deposited in the museum of this Society bear a general resemblance to those of the Rocky Mountain species, but are smoother, and form a much more open spiral the terminal third is very much compressed, the medial intermediate, and the basal very thick and triangular they were only in their fifth year of growth, and would doubtless have attained to much greater dimensions Their length is 32 inches measured over the front ridge, and girth at base $14\frac{1}{2}$ inches, having a span of $12\frac{1}{2}$ inches from base to tip inside from the tip to first annual depression they measure $12\frac{1}{2}$ inches and then successively $6\frac{1}{4}$ $5\frac{1}{2}$ $4\frac{3}{4}$, and the incipient fifth year s growth 2 inches They do not bulge between the angles, which are rather obtuse and, as usual, are transversely striated Approximate distance of the tips apart 33 inches

"From the testimony of the Indian tribes about the Great Falls of the Columbia River' writes Mr Douglas 'this species appears to inhabit the subalpine regions of Mounts Wood, St Helen s and Vancouver, but is more numerous in the mountainous districts of the interior of California The only good skin that ever came under my observation was in lat 46° 14′ 55″ and long 121° 17′ 0″ ’ Forbes, in his recent work on California, appears to allude to it by the name of *Berindo*, which in Mexico is applied to the *Antilocapra furcifera* He quotes however the description by Venegos including the statement that it has a short tail, and remarks that they still abound in the plains at the foot of the mountains, and are always found in large herds ’ It does not from the context appear to me that the prong horned animal is intended

From these we might proceed through the domestic *Aries* to the species generally typified by the Moufflon of Corsica but I shall interpolate a small group from the Himalaya, and apparently Caucasus distinguished by having smooth and sub cylindrical horns that form a bold arc outwards at nearly right angles with the axis of the body, and have the tip turned backward Such is

6 *O Nahoor* Hodgson , the *Nahoor* or *Nervati* and *Sna* (not *Sha*) of Thibet Size of the larger breeds of tame sheep with pale horns and general colour dull brownish grey in old animals with the ordinary dark markings on the face, breast and limbs more or less developed Younger specimens, more particularly have their coat when renovated tipped with a light fulvous tint deeper along the middle of the back the tail is bushy and conspicuously white its medial portion generally dark Length as given by Mr Hodgson 4 feet from nose to base of tail, and height of the back 32 inches A female was 3 feet 4 inches from nose to tail and stood 29 inches high at the shoulder From nose to between the horns a male measured 8½ inches, the ears 4½ inches and tail 4 inches or 7 inches to the end of the hair A pair of horns in the museum of this Society which are far from having attained their full growth, measure 12 inches in circumference at base and 20½ inches long over the curvature having their tips 27 inches asunder their successive annual growths were respectively 6½ 4 3, 2¾ 2½ and 1¼ inches Mr Hodgson mentions a pair that were each 32 inches long Those of a very old female in the British Museum have precisely the same curvature as in the male only that the tips do not turn so much backwards they are, however much compressed, and measure 9¾ inches long 4½ inches round, with the tips 14 inches apart Another female, in the collection of this Society is entirely destitute of horns The latter and a young male which I formerly examined at Mr Leadbeater s accorded perfectly with the description of Mr Hodgson, having pale slaty-blue hairs, deeper on the back, and tipped with a rufous tint, more particularly on the back, which caused the animal to appear of a pale fulvous or isabelline hue An old male in the museum of the Linnæan Society*, and the aged female in the British Museum, together with another skin which I have seen, have not only no trace of this colour in their present state of *pelage*, but I doubt whether they showed much of it when their coat was new the colour of all three is a dingy grey-brown, not easy to express in words

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* Mistaken for *Ovis Ammon* in the ‘Fauna Americana borealis,’ vol i p 274 and for a second specimen of *O Burrhel* in Part 6, p 79, for July 10th, 1838, of these ‘Proceedings

The horns of the Nahoor differ but little in flexure from those of the next species, but may nevertheless be distinguished by many differences in general strongly pronounced as their superior size, the greater proportional thickness of the basal half beyond which they narrow somewhat abruptly, the flatness of their dorsal aspect with a much more acutely raised ridge along its middle and by the comparative sharpness of all the angles, together with the existence, generally, of some traces of cross striæ more particularly towards their compressed tips, whereas the horns of the Burrhel Sheep are much less angular of a deep rufous brown colour and quite smooth Those of the female Nahoor described were entirely destitute of cross furrows, but all have the marks of annual growth conspicuously indented

This species according to Mr Hodgson inhabits the Kâchar region of Nepal northward of the habitat of the Jharal Goat amid the glaciers of the Himalaya and both on the Indian and Thibetan sides of that range" Mr Vigne informs me that it is plentiful in Great but not in Little Thibet I suspect that it is never found at so considerable an altitude as the next species

[To be continued]

XXVII —*Flora of Central Norfolk* By S P Woodward, Esq

Addenda to Mr Mann's List of Norwich Plants

Upon comparing the list of Norwich Plants given by Mr R J Mann, in the August number of the 'Magazine of Natural History' (vol iv p 390), with my own, I found many interesting plants and localities had been omitted, and as it is not to be expected that one observer should, in a few years' investigation, discover all his district contains, I cannot but regret that Mr M did not avail himself more extensively of the information of other collectors For the omitted localities there is no remedy, and for the plants time only allows me to give what are recorded on my lists in addition to those just published Mr Wigham, of Norwich, could, I believe, supply many others which his long residence has made him familiar with In the Mosses and Hepaticæ much remains to be done ere our list will vie with that of Yarmouth, published by Mr Paget, the freshwater Algæ of this district have been entirely neglected, and the Lichens, no one, that I am aware of, could catalogue Mr Paget's list, which gives the result of the labours of Mr Dawson Turner and other indefatigable botanists, must represent all that is known at present of the distribution in Norfolk of these extensive and intricate classes Mr Stock of Bungay, who has for some years collected the minute parasitic Fungi with great perseverance and success, will, it is to be hoped, some day publish a detailed list, in the other classes the Norfolk Flora is probably as extensive and varied, and as well investigated, as that of any English county

I have ventured to introduce—*in brackets*—some plants which are a few miles beyond the *ten mile circuit*, because I believe they may be found within it, and a few which are considerably beyond, because they are either omitted in the published floras, or their recent occurrence in the spots indicated is not well known

Of those plants for which I have given authorities, I have, with few exceptions, received specimens, those in Roman are generally considered only varieties

EXOGENÆ

Clematis Vitalba Hedges and thickets, Eaton, Long Stratton, Brooke, Hockering
Ranunculus arvensis Corn-fields Stoke Holy Cross Armeringhall
———— *auricomus* Lakenham Hall Wood
———— *parviflorus* Armeringhall
———— pantothrix, circinnatus Ditches common
Adonis autumnalis Waste ground Lakenham
Papaver hybridum Lanes and borders of fields, Lakenham
———— *dubium* Ditto abundant
Corydalis lutea Old walls frequent
*Lepidium Smithii** Lanes, Eaton and Lakenham
Thlaspi arvense Lakenham near the Hall Farm
Nasturtium amphibium Lakenham Marshes
Brassica Napus Fields and waste places
Viola flavicornis Mosswold
———— arvensis Fields frequent
———— *suavis* Thorpe, Horstead
Helianthemum vulgare Westfields, Eaton
Sagina apetala Banks frequent St Faith's, &c
Cerastium aquaticum Lakenham Marshes
———— *semidecandrum* Borders of Drummond s Grove Thorpe
Sedum rupestre Bracondale Hall Wood
———— (*album* Walls Dereham)
Chrysosplenium oppositifolium Stoke Holy Cross
———— *alternifolium* Ditto, Poringland
Ulex nanus St Faith s Heath
Vicia angustifolia Lanes and chalk-pits
Lathyrus sylvestris Brundall
Lotus tenuis Dry chalky pastures
Trifolium ochroleucum Poringland, Long Stratton
————*fragiferum* St Faith's, near Dereham, in Acle
————*procumbens* Fields and hedges
Rubus Kœhleri Hedges and woods frequent
Rosa tomentosa St Faith's Wood
Pyrus torminalis Lakenham Hall Wood
———— *Aria* Woods and plantations

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* *L campestre* I have not seen nearer Norwich than Dereham or Bungay

Circæa lutetiana Armeringhall Wood
Ribes Grossularia Lakenham Hall Wood
Sison Amomum Chalky pastures towards Dereham, Long Stratton Bungay-road
Silaus pratensis Long Stratton, &c
Peucedanum palustre Horning
Galium parisiense Carhoe Abbey
Campanula Rapunculus Lakenham Brooke
———— *hybrida* Corn fields abundant Eaton, &c
Dipsacus pilosus Loddon , near Dereham
Scabiosa columbaria Hedges and copses Lakenham Keswick &c
Lactuca virosa Carhoe Abbey, Whitlingham (St Benedict's Abbey)
Bidens tripartita St Faith's &c frequent
Onopordum Acanthium Borders of fields frequent
Carlina vulgaris Bramerton Heath
Conyza squarrosa Strumpshaw &c Mr Wigham
Cnicus acaulis Horning (Neatherd Moor and Scarning Fen Dereham)
Myosotis cæspitosa Lakenham St Faith's
Lithospermum arvense Postwic Crag-pits
Cuscuta europæa (Burston near Diss C B Prentice Cromer)
Oxycoccus palustris Stoke Holy Cross Mr Bayfield Horning
(*Pyrola rotundifolia* Bogs by Upton Broad 1840 S P W)
Chlora perfoliata Armeringhall Mr Wigham
*Gentiana campestris** St Faith's Common 1837 J W E and S P W
——— (*amarella* Scarning Fen Dereham)
Vinca minor Thickets and copses
Verbascum Lychnitis Borders of fields and waste ground
———— *nigrum* Lanes Lakenham Bungay-road
Datura Stramonium Waste ground and chalk-pits
(*Atropa Belladonna* Toft trees near Fakenham)
Utricularia minor, vulgaris St Faith's Bogs, B B W (Roydon near Diss)
Digitalis purpurea Plantations and woods, Keswick, Sprowston
Melampyrum arvense Costessy
(*Linaria minor* Near Dereham, B B W)
Orobanche minor Lakenham, &c frequent
(*Scrophularia vernalis* Langham, 1840, Mr G Clowes)
Mentha sylvestris Meadows near Harford Bridges
Acinos vulgaris Keswick Hall grounds Eaton
Galeopsis versicolor Hethersett
Stachys arvensis Fields and lanes, Lakenham
Aristolochia Clematitis Carhoe Abbey
Rumex palustris Felthorpe, &c
—— *aquaticus* Marshes abundant
—— *sanguineus*, β Armeringhall
Polygonum Bistorta Lakenham, Brooke, Sizeland
Euphorbia Lathyris Road sides and waste places

* *G amarella* of Mr Mann

Salix Caprea cinerea, stipularis Ozier-holts and woods frequent
Populus canescens Banks of the Yare and Tees
Castanea vulgaris Woods and plantations
Taxus baccata Hockering small trees frequent
Pinus sylvestris Keswick Hall small trees frequent

ENDOGENÆ

(*Stratiotes aloides* Ditches Acle Barton Broad &c)
Sparganium flutans Ponds on St Faith's Common
Potamogeton pusillus Yare, by Lakenham
———— *gramineus* Yare, Norwich
———— (*prælongus* Waveney by Bungay Mr Stock and Mr C Babington)
Iris fœtidissima Armeringhall Wood (Bath Hills Bungay)
(*Gymnadenia conopsea* Scarning Fen Dereham)
———— (*viridis* Fields near Bungay)
Habenaria chlorantha Armeringhall Wood
———— (*bifolia* ? St Faith's see Mr Mann's list, Upton near the Broad)
Ophrys muscifera Stoke Holy Cross
Listera Nidus avis Armeringhall Wood Mr J W Ewing
Liparis Læselii St Faith's Bogs
Convallaria multiflora Lakenham Hall Wood
Ornithogalum umbellatum Postwic Churchyard (St Benedict's Abbey)
Tulipa sylvestris Bracondale, Mr Bayfield, Trowse Kirby Bedon fields and chalk-pits rare
Scilla nutans Woods everywhere
Muscari rac[illegible]mosum City walls
Paris quadrifolia Bunwell Wood, Mr G E Bolingbroke Costessy
Acorus Calamus Moat Cringleford Hall (St Benedict's Abbey) flowering freely 1840
Luzula pilosa Armeringhall Wood
Scirpus setaceus St Faith's Bogs
Rhyncospora alba Felthorpe
Eleocharis multicaulis St Faith's Bogs
Carex divulsa Bixley, Lakenham Hall Wood
—— *remota* Armeringhall, ditches and woods
—— *stellulata* Lord Roseberry's grounds, Bixley
—— (*divisa* Meadow by Acle Bridge, 1836 S P W)
—— *fulva* Lakenham Marshes
—— *Œderi* Poringland
—— *filiformis* Surlingham, near the Broad
—— *pulicaris* Cringleford Marshes
—— *teretiuscula* St Faith's Bogs
—— (*pendula* Scarning Fen, Dereham B B W)
(*dioica* Scarning Fen, B B W , Ellingham Fen)
Aira flexuosa St Faith's Bogs
*Poa bulbosa** Old walls, Horsefair, Norwich
—— *nemoralis* Lakenham Hall Wood
Calamagrostis lanceolata Lakenham Marshes

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* Mr D Turner has seen this it was found by Mr Mann

Hordeum pratense Meadows frequent

Avena fatua Corn-fields

—— (*pubescens* Fields Dereham)

Bromus asper Borders of fields frequent

——— *secalinus* Wheat-fields, Lakenham (Smallburgh)

——— *racemosus* Pastures frequent

——— *giganteus* Woods frequent

CELLULARES

Filices

Cystopteris fragilis Old wall Norwich 1835

Polystichum lobatum Lakenham Long Stratton (Dereham)

——— *angulare* Brundall (Fakenham Mundesley)

——— (*aculeatum* Near Fakenham)

Lastræa dilatata Drummond's Grove, Thorpe Stoke Holy Cross Cringleford

——— (*spinulosa* Holt Heath, Fritton Heath, Bawsey)

——— (*cristata* Edgefield Heath near Holt Fritton Heath near Yarmouth Bawsey near Lynn Mr J W Ewing 1840)

——— *Thelypteris* St Faith's Felthope (Scarning Filby Upton)

——— (*Oreopteris* Near Cromer, Mr J W Ewing 1840)

Athyrium Filix fœmina Horning (Scarning Filby Fritton, Belton, Upton)

Asplenium Ruta muraria Lakenham and Eaton Bridges (Dereham and Hasboro Churches)

——— *Trichomanes* Aylsham Eaton Lakenham (Fakenham Churchyard), old walls tombs, lanes &c

(*Ceterach officinarum* Heydon Church Mr Stock)

Ophioglossum vulgatum Lakenham Hall Wood Whitlingham Wood, Arminghall Wood Horning (Upton Ellingham)

Botrychium lunaria Stratton Strawless

Musci

Phascum cuspidatum Clayey banks Lakenham

——— *crispum* Clayey banks Bixley

——— *rectum* Clayey banks near Harford Bridges

——— *axillare* Moist ground Lakenham

——— (*muticum* Belton near Yarmouth hedge-banks)

Sphagnum squarrosum St Faith's Bogs, &c

Bartramia fontana Bramerton (Scarning B B W)

Gymnostomum truncatulum fasciculare pyriforme Shady banks, Bixley, Lakenham

Splachnum ampullaceum (Barren) Upon animal excrement in bogs not unfrequent

Weissia lanceolata Hedges, Lakenham

Didymodon purpureus Mosswold &c dry banks abundant

Dicranum scoparium Mosswold &c dry banks abundant

——— *adiantoides* St Faith's, boggy ground frequent

——— *taxifolium* Bixley Church Lane

——— *glaucum* St Faith's, &c abundant in bogs

Tortula unguiculata Lakenham and Bixley, on hedges

Polytrichum juniperinum. St. Faith's Heath (Scarning Fen).
———— (*urnigerum.* Gillingham.)
Orthotrichum cupulatum. Trees, Lakenham.
———— (*Hutchinsiæ.* Ruins of the Garianonum, near Yarmouth.)
Anomodon viticulosum. Armeringhall Wood.
———— (*curtipendulum.* Fakenham Heath.)
Bryum argenteum. Walls and moist ground everywhere.
—— *nutans.* Hedge-banks, rather rare.
—— *roseum.* Mosswold, Bramerton.
—— *hornum.* Drummond's Grove, Thorpe, Lakenham.
—— *cuspidatum.* Drummond's Grove, moist lanes, frequent.
Buxbaumia aphylla. Sprowston, Sir W. J. Hooker.
Leucodon sciuroides. Lakenham, on trees and walls.
Daltonia heteromalla. Lakenham, on trees.
Fontinalis antipyretica. The Yare and Wensum.
Hypnum complanatum. Hawthorn fences.
——— *lutescens.* Bramerton.
——— *albicans.* Mosswold.
——— *alopecurum.* Armeringhall.
——— *proliferum.* Armeringhall, Lakenham Hall Wood.
——— *stellatum.* Bogs and marshes.
——— *triquetrum.* Heaths and woods, abundant.
——— *squarrosum.* Lanes and woods, frequent.
——— *palustre.* Marshes.
scorpioides. Marshes and bogs.
—— *molluscum.* Markshall, hedge-banks.
—— (*dendroides.* Fakenham.)

HEPATICÆ.

Riccia crystallina. Banks at Bixley and Armeringhall, turnip and clover-fields, frequent.
Sphærocarpus terrestris. Banks at Bixley and Armeringhall, turnip and clover-fields, frequent.
Marchantia polymorpha, conica, hemisphærica. Walls and banks, river-side, &c., frequent.
Jungermannia bicuspidata. Damp lanes and woods, frequent.
———— *complanata, dilatata.* Trees, frequent.
———— *connivens.* Bogs among Bryums.
———— *pinguis.* Ditches and bogs, frequent.
———— (*asplenioides, tamarisci.* Ruins of the Garianonum near Yarmouth.)

XXVIII.—*On the Formation of the Stomata.* By HUGO MOHL. (Linnæa, 1838, p. 544, with a Plate.)*

M. MIRBEL is the only person, so far as I know, who, in his memoir on *Marchantia polymorpha*, has published any researches on the development of stomata He has shown that they are developed in two different modes First, there is found, in the epidermis, at the period of formation of a stoma, a little cavity, the bottom of which is occupied by an epidermal cell, which is surrounded by four other cells By the absorption of this central cell the opening of the stoma is produced This is the usual mode of development on the foliaceous expansions of the *Marchantia* Upon the floral peduncles, on the contrary, the development generally takes place in an entirely different manner The bottom of the cavity is formed by from three to five wedge-shaped cells, which touch each other at the centre, and which at a later period separate in such a manner as to show an opening in the form of a star The cells always contract more towards the exterior, being transformed into an obturator ring, whilst the epidermal cells placed around form the margin of the stoma

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* From the translation in the Annales des Sciences Naturelles, April 1840, p. 222.

There is evidently a defect in this explanation of the development of the stomata, as it is not explained how the same form of stomata can originate in two such different ways Indeed, in the first case, we cannot conceive how the porous cells, which constitutes what Mirbel calls the *anneau obturateur*, are formed If the stoma is formed in consequence of the absorption of the epidermal cell, and the surrounding epidermal layers form the margin, the stoma would be formed only of a simple opening This however is not met with in nature, for inwardly, at the margin, two or more cells (porous cells) are seen, which enclose the stoma itself The origin of these porous cells is explained by the second manner of development described by Mirbel, but it is not in the first case

I have endeavoured to solve the question by examining the *Marchantia polymorpha*, but I have not been successful, because in this plant the examination of the epidermis in its youngest state presents very great difficulties, as it can only be taken off by means of a scalpel, and does not therefore admit of being separated free from the subjacent parenchyma In this way some of the subjacent parenchymatous cells are always removed with the epidermis, and prevent our recognizing with the necessary precision the slight changes which take place in the stomata at the moment of their production

Respecting these researches, I shall confine myself therefore to merely stating, that I have seen the stomata originate on the frond of the *Marchantia* in the second mode pointed out by Mirbel, but I have not succeeded in seeing any stomata originate from the absorption of a cell

To make amends, I think that I have observed with sufficient precision the formation of the stomata on the leaves of the *Hyacinthus orientalis* I chose these leaves, not only because their stomata are of considerable size, but because by their growth from above downwards, it is easy to observe, on the same leaf, all the series of facts which the stomata present in their development These organs, indeed, are already perfectly developed on the higher and oldest part of the leaf, whilst, in the lower part, newly formed and still enclosed in the bulb, they do not yet exist

It is in this lower part of the leaves and between the epidermal cells that smaller quadrangular cells may be observed, the transverse diameter of which is a little longer than the longitudinal (Pl II fig 1, *a*, *a*) These cells, as well as those of the epidermis, are colourless Sometimes they contain nothing, and sometimes they enclose a slightly granular mass

Higher up, towards the apex of the leaf, this granular substance is met with collected in a round mass, which frequently however is not clearly defined At the same time a partition forms in the middle of the cell and in the longitudinal direction of the leaf At the beginning this partition is but slightly indicated (Pl II fig 1, *b*) , but soon the lines that limit them are as clearly drawn as those which mark the lateral walls of the cells (fig 2, *a*)

This partition now begins to double , thus the first trace of a stoma establishes itself, and the cell, originally simple, divides and forms the two cells of the pores

In the course of the development, the cells which surround the pore enlarge, and the central slit enlarges in a still greater proportion The grumous mass is always found accumulated on the inner walls of these cells, and communicates with the other walls of the cells by means of filiform processes (fig 3)*

Lastly, in the perfectly developed stoma (fig 4), the grumous mass contained in the cells which form the border of the pore is equally distributed in their interior, where the grains of chlorophylle are likewise formed

The development which I have just described takes place very regularly in each stoma, but the same part of the leaf does not always exhibit stomata at the same stage of development Certain stomata frequently outstrip others close beside them

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* These threads, which unite a mucous mass situated in the cellular cavity with the cellular partitions, are met with not only here, but they are often found elsewhere, for example, in the hairs of the young stalks of Gourds, and in the articulations of *Zygnema*

I have not yet made observations with a view to decide if the above description of the development of the stomata agree with all cases, or whether in other plants it presents essential modifications in the process of this operation, but it is probable enough that the first method of development indicated by Mirbel in no case presents itself in an isolated manner, but that it is only the commencement of the second mode, that there is no absorption of the central cell, and that this, in the *Marchantia*, divides into four, as it separates into two in the *Hyacinthus orientalis*

BIBLIOGRAPHICAL NOTICES

The Natural History of South Devon By J C Bellamy, Surgeon
Plymouth 1839 8vo pp 456

It is only by collecting diligently facts from every part of a country, that we can expect to arrive at those general principles which regulate the distribution of plants and animals over its surface In this respect every work that contributes to the information we already possess ought to be hailed as the omen of progress in our knowledge of the natural history of the earth We have already had many able attempts at giving complete views of the distribution of animals and plants in many districts of our own island and we have now to add another to the list Mr Bellamy has produced an interesting volume with regard to the delightful county in which he dwells, which will not only be read with pleasure by those who reside on the spot but will be welcomed by the naturalist as an accession to British natural history

Mr Bellamy s work is divided into three parts The first part is divided into five chapters and treats of the geological character of South Devon and the nature of its climate The structure of the strata in this district is minutely described, and several new and interesting fossils are described and figured The second part is occupied with lists of the vertebrate and invertebrate animals of the district, with the exception of the insects and with various observations of the author on the animals of South Devon The third part is devoted to ' Remarks on numerous subjects of Natural History but more particularly on Birds A great number of these remarks are original, and are made in such a manner as cannot fail to interest the general reader

In this volume Mr Bellamy has introduced to our notice four additions to the British Fauna These are respectively named *Arvicola hirta, Mus intermedius Sylvia neglecta* and *Helix subvirescens* We cannot however pronounce upon the accuracy of the descriptions, nor the value that ought to be attached to them, because we have not the specimens before us We hope however that the approaching meeting of the British Association will enable some of our eminent zoologists to examine Mr Bellamy's specimens, and report upon their title to be recorded as new species

The name of the volume might lead some of our readers to suppose that every branch of the natural history of South Devon was treated on, but we think it only right to state, that the author has not given any lists of the plants or insects of the district In a second edition we should advise that this hiatus be filled up, and we think that the author on reconsidering some parts of the work would find that this might be done without at all increasing the size of the volume

Memorie della Reale Accademia delle Scienze di Torino Second Series Vol I 1839

The following are the papers relating to Natural History in the last two volumes of the Turin Transactions —

Programma di Botanica,—with Prize offered for the best Monograph of a tribe of Italian Cryptogamous Plants —Geological and Mineralogical Observations on the Mountains lying between the Valleys of Aosta and Susa in Piedmont, by Prof A Sismonda — De quibusdam Insectis Sardiniæ novis aut minus cognitis Fasc II , auctore Jos Gené —Notices of two Fossils found in the Hills of St Stefano Rocro by Prof A Sismonda —Memoir on six new Species of Cephalopods found in the Mediterranean at Nice, by J B Verant —On the structure and position of the organs of Hearing and Sight in the principal Genera of Mammifera by C F Bellingeri, M D —Description of a new Cetacous Fossil, by G D Bruno of the Zoological Museum of the University —Investigations respecting some variations observable in univalve freshwater and land Mollusca, by C Porro —Synopsis Reptilium Sardiniæ indigenorum, auctore J Gené —Primitiæ Hepaticologiæ Italicæ, auctore Jos De Notaris —Essay on the employment of Animal Charcoal for the extraction of the Bitter Principle of the Camepiteos, and on the action of the same upon the Sulphate of Quinine and of Cinchonina, by V Griseri

Vol II

On the Earthquakes felt in the province of Maurienne from Dec 1838 to March 1840, by Monseigneur Al Billiet —Mineralogical and Geological Observations made with a view to the formation of a Geological Map of Piedmont, by Prof A Sismonda —Description of a new Sardinian Falcon *Falco Eleonoræ**, by Prof G Gené — Observations by Dr P Savi on the Structure and Existence of the Stomata in certain Plants, in a letter to Prof Amici —Florula Capraniæ, sive Enumeratio Plantarum in insula Caprania vel sponte nascentium vel ad utilitatem latius excultarum, auct Jos Moris et Jos De Notaris —Amphibia Europæa ad Systema nostrum Vertebratorium ordinata, auct Car L Bonaparte Musignani Principe —Microscopic Observations on the Movements of Vegetable Globules suspended in a Menstruum by Prof J D Botto

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* So called in honour of Queen Eleonora, by whom was promulgated the very ancient code for the preservation of the Falcons for which Sardinia was celebrated, from which the following extract is given —"Constituimus et ordinamus qui nexiunu homine non depiat bogare Astore neu Falcone dae nidu, et icussu qui lu det bogare siat obligadu lu Curadore de sa Curadoria (an officer of justice) d unde det essere su homine, de tenerlu et batirelu a nois, cum pena de pagare su Curadore libras quimbe"— *Carta de logu*, c 88

PROCEEDINGS OF LEARNED SOCIETIES

MICROSCOPICAL SOCIETY

Feb 17 —A paper was read by Mr Owen ‘On the Microscopic Structure of certain Fossil Teeth from the Old Red Sandstone near Elgin ”

The fossils were from the middle or cornstone division of that formation and are interesting from the extreme rarity of organic remains referrible to vertebrated animals in such formation The microscopic structure of these teeth, which Mr Owen described in detail, is quite peculiar and characteristic of the teeth in question, so as to justify the indication of a distinct genus of animals for which the name of *Dendrodus* was proposed

Four species of these teeth were described, viz *Dend bifurcatus, D strigatus, D hastatus* and *D sigmoideus*, and the modifications of the Dendritic structure pointed out in each

Upon the whole the characters of the microscopic structure resemble those of the teeth of certain fishes, as the Shark Sphyræna, etc , but with modifications that approximate it to the peculiar structure of the teeth of the extinct Batrachian genus *Labyrinthodon*, from the new red sandstone

Mr Owen concludes, therefore, that the *Dendrodus* was a fish, but that it might have approached more nearly than the rest of the class to the Labyrinthodont group of *Batrachia* The teeth resemble in external form and longitudinal striation those of the *Labyrinthodon* and should other remains raise the *Dendrodus* to that order it will be the first vertebrate animal higher than fish that has been found in the old red sandstone

Sections of the teeth described and diagrams were exhibited in illustration of the paper

Mr Owen next proceeded to give an account of his examination of the microscopic structure of the teeth of the *Lepidosiren annectens*

Although almost the whole organization of this species is known there is as much doubt in the minds of many naturalists respecting the class of Vertebrata to which it really belongs, as may be entertained regarding the *Dendrodus*, of which only the teeth have been examined

Mr Owen referred to the grounds on which he had concluded the *Lepidosiren* to be essentially a fish (Linnæan Trans , xviii p 350) and to the subsequent anatomical description of the animal by Dr Bischoff who considers it to be a reptile and he then proceeded to describe the microscopic structure of the teeth of the species from the Gambia, and to show, according to this additional test of its affinities that it must be regarded as a true fish The body of the tooth consists of a coarse dentine traversed by numerous large anastomosing medullary canals without any trace of Purkinjian corpuscles this is coated by a thin layer of dense dentine traversed by fine calcigerous tubes continued from the peripheral loops of the medullary canal

This structure agrees with that modification which is most characteristic of the class of Fishes, and has not been found in the teeth of any of the Perennibranchiate Reptiles The cumulative evidence of this fact, with the ichthyic type of the microscopic structure of the ossified parts of the skeleton the disposition of these parts, forming double superior and inferior spinous processes a pre opercular bone and their green colour, the gelatino-cartilaginous vertebral style the many-jointed ray of the rudimentary fin large cycloid scales the intestinal spiral valve, six pairs of branchial arches, with gills concealed and protected by an operculum the blind nasal plicated sacs these, receiving the additional evidence from the intimate structure as before from the form, number and attachment of the teeth must outweigh the argument for its amphibious character which is supported only by the lung-like structure of its divided air-bladder —a structure which some Malacopterygious Sauroid fishes possess in common with the *Lepidosiren*

Professor Ehrenberg of Berlin, and Professor Purkinje of Breslau were elected Honorary Members, and Daniel Cooper, Esq , an Ordinary Member of the Society

March 17 —George Loddiges Esq , in the Chair

A paper was read by George Busk Esq of the hospital-ship Dreadnought On the Anatomy of *Tricocephalus dispar* " in which the author directs attention to certain points in the anatomy of that Entozoon, upon which all helminthologists appear to have erred

The author after describing minutely the structure and arrangement of the digestive and generative systems arrives at the following conclusions —1st That the *Tricocephalus* has a distinct vulva and that the generative and digestive tubes do not communicate at a cloaca nor terminate at a common orifice, as described by all writers on the subject 2nd That in the presence and situation of the vulva this Entozoon obviously very closely resembles the *Strongylus* and most other nematoid worms and thus an apparently great anomaly in the arrangement of this class is removed 3rd That the alimentary canal is not so simple as is commonly supposed 4th That the *Tricocephalus* is in all probability simply oviparous, and that the ova become perfectly formed only a short distance from the orifice, perhaps from being there only within reach of the male fluid

BOTANICAL SOCIETY OF EDINBURGH

March 25, 1841 —Dr James Macaulay in the Chair

The following communications were read —

1 Notice of *Carum bulbocastanum*, Koch from two English localities, by Mr Isaac Brown, Hitchin, Herts Mr Brown pointed

out the chief differences between this plant and *Bunium flexuosum*, Sm (*denudatum, DeC*), with which it appears, by English authors, to have been confounded Specimens gathered in July last between Dunstable and Barton, and others from near Baldock, were exhibited

2 Notes on *Physospermum cornubiense* and an account of its discovery near Tavistock, in Devonshire by the Rev W S Hore, Stoke Devonport Mr Hore, in collecting this plant at Bodmin, in Cornwall its original and only known English locality observed that it was chiefly in oak coppices that it seemed to be found In August last he noticed a single specimen of it in a hedge row between Newbridge and Tavistock, and being induced to enter a neighbouring oak coppice in search of it, he there found it in considerable abundance The root he observes fits it admirably to contend with the brambles and brushwood amongst which it grows

3 Notice of a curious variety of *Scolopendrium vulgare*, found near Arbroath by Mr W C Trevelyan Specimens were presented having the midrib prolonged in a remarkable manner nearly an inch beyond the termination of the frond

4 An attempt to ascertain the true *Hypericum quadrangulum* of Linnæus, by Mr Charles C Babington Mr Babington was led to make the present inquiry in consequence of specimens collected by the Rev T B Bell in Arran having been distributed by the Botanical Society named *Hypericum dubium* which appeared different from the English plant so called Much confusion has arisen regarding this species, from its appearing from the Linnæan Herbarium that *two* species have been included by Linnæus under the name of *quadrangulum* viz *H dubium* of Leers and *H quadrangulum* of Smith Mr Babington, after a careful examination of specimens and reference to numerous authorities proposed that the following names should be adopted —1 *H quadrangulum*, Linn (Hort Cliff) English Bot, tab 370 &c being the plant named *H tetrapterum* by Mr Babington in his *Primitiæ Floræ Sarnicæ*, and in Leighton s Flora of Shropshire 2 *H dubium* Leers English Bot, tab 296, &c being the plant from Arran before alluded to 3 *H maculatum*, Crantz (Flora Austr ed alt), being the *H delphinense* of Villar s Fl Delph *H quadrangulum* of Leighton s Flora of Shropshire, and the plant usually considered *H dubium* by English botanists

5 On the Geographical Distribution of British Ferns, by Mr Hewett Cottrell Watson In the outset of this paper Mr Watson remarks that, " excepting some spots of small extent, whence they are banished by local peculiarities of surface, Ferns may be said to range over the whole of Britain from south to north, from east to west, and from the shores of the sea almost to the summits of the loftiest mountains, from which latter situation they are probably absent rather in consequence of the bleak exposure to wind, than of the diminished temperature incidental to the height of any of our mountains' Assuming 40 as the medium number of the species of British Ferns, and 1400 as that of the Flowering Plants, it appears that 1 to 35 is the proportion which the former

bear to the latter Then follows a table showing the proportions which they hold in several neighbouring islands and continental districts ranging from 1 to 25 to 1 to 67 A similar comparison is instituted with regard to 20 of our most complete Local Floras, showing nearly the same results A subsequent table exhibits the frequency of occurrence of each of the British species of Ferns throughout the 20 Local Floras above mentioned, and 24 local lists communicated by correspondents in various parts of England and Scotland and the adjacent islands

Several donations were presented, amongst which may be noticed —1 An old Herbarium, which, from the handwriting and the references to Parkinson's Herbal appears to have been made in England during the latter part of the seventeenth century from David Laing, of the Writers to the Signets Library 2 A Catalogue of 235 species of Flowering Plants, found in the Shetland Islands, by Mr Thomas Edmondston, Jun 3 A Catalogue of Plants found near Audley End, Essex, by the Rev J E Leefe

LINNÆAN SOCIETY

December 15, 1840 --Mr Forster, V P, in the Chair

Read, an "Account of two new Genera of Plants, allied to *Olacineæ'* By George Bentham Esq, F L S

The two new genera on which this paper is founded are *Pogopetalum,* Benth, collected by Mr Schomburgk in British Guiana, and *Apodytes,* named but not described by Prof Ernst Meyer, among the South African plants collected by Drège A third genus *Leretia* of Vellozo, figured in the 'Flora Fluminensis' is also characterized for the first time

After noticing the opinions of various authors as to the affinities of *Olacineæ,* and enumerating the genera hitherto referred to that family, Mr Bentham enters into a detailed examination of its characters and of their modifications in the different genera, the most important of which he condenses into the following character of the Order

Ord OLACINEÆ

Calyx parvus, liber v basi adnatus, truncatus v denticulatus, fructifer persistens immutatus v auctus *Corollæ* petala 4, 5, v 6 hypogyna v subperigyna, subcoriacea, æstivatione valvata, libera v per paria connexa v basi in tubum coalita *Stamina* definita, cum petalis inserta, iis coalita v libera, numero petalorum dupla v æqualia fertilia rariùs asymmetrica, alterna sæpe sterilia difformia *Antheræ* introrsæ, biloculares, loculis rima longitudinali dehiscentibus *Ovarium* toro nunc parvo, nunc incrassato et interdum cum calyce concreto insidens, 1-loculare (nunc spuriè et incomplete 3—4-loculare) v rariùs excentrice 3-loculare *Ovula* in loculo 2, 3 v 4 collateralia, rariùs solitaria, ab apice placentæ liberæ v ovarii v dissepimentis spuriis connatæ pendula, anatropa *Stylus* erectus, simplex, stigmate nunc truncato tenui, nunc incrassato 2—3—4-lobo *Drupa* calyce immutato stipata v ampliato cincta, velata v adnata, pericarpio tenui carnoso v exsucco, putamine crustaceo v osseo, abortu 1 spermo, rariùs 2—3-spermo *Semen* inversum, v sæpiùs placentâ cum illo a basi concretâ spuriè erectum, umbilico lato basilari affixum *Embryo* in axi albuminis copiosi carnosi, rectus, apici fructus proximus, nunc brevissimus, rariùs dimidio albuminus longior, radiculâ apicem fructûs spectante brevissimâ, cotyledonibus semiteretibus, plumula inconspicuâ *Arbores* v frutices erecti v interdum scandentes inermes v ramis axillaribus spinescentibus armati, glabri v parcè pubescentes *Folia* alterna, simplicia, integerrima, exstipulata, glandulosa *Flores* hermaphroditi, v abortu polygami, nunc axillares distinctè v irregulariter racemosi, spicati v cymosi, nunc terminales cymoso paniculati rariùs solitarii laterales v axillares *Bracteæ* squamæformes, sæpiùs minutæ, rariùs juniores imbricatæ *Bracteolæ* parvæ in cupulam connatæ v nullæ

Mr Bentham distinguishes three tribes characterized as follows

Trib I OLACEÆ *Ovarium* basi dissepimentis spuriis (rariùs evanidis) 3—4 loculare, apice 1-loculare, placentâ centrali dissepimentis spuriis basi adhærente superne liberâ *Ovula* tot quot loculi spurii ex apice placentæ pendula *Semen* erectum *Inflorescentia* axillaris, racemosa, racemis rariùs ad florem unicum reductis

Trib II OPILIEÆ *Ovarium* a basi 1-loculare *Ovulum* (saltem per anthesin) unicum, minimum, ab apice placentæ liberæ centralis pendulum *Stylus* centricus *Semen* erectum *Inflorescentia* axillaris, racemosa

Trib III ICACINEÆ *Ovarium* a basi 1 loculare, v excentricè et complete 3-loculare *Ovula* in quoque loculo duo, ab apice placentæ hinc ovario adnatæ collateraliter affixa, pendula, in loculo superposita, placentâ altera elongatâ *Stylus* excentricus *Semen* pendulum *Inflorescentia* cymosa, axillaris v terminalis

To the first tribe Mr Bentham refers *Heisteria*, L, *Ximenia*, L, *Olax*, L (including *Spermaxyrum*, Labill, and *Fissilia*, Comm), and *Schœpfia*, L, to the second, *Opilia*, Roxb (including *Groutia*, Guill), and *Cansjera*, Lam, and to the third, *Gomphandra*, Wall, *Icacina*, A Juss, *Apodytes*, *Leretia* and *Pogopetalum*

He considers *Schœpfia* to be far removed from *Loranthaceæ* by the structure of its ovary, while it differs from *Symplocos* in the æstivation of its corolla and the incomplete division of its ovary,—two points in which it agrees remarkably with *Olax* and *Ximenia* He describes the greater part of its ovary as well as the margin of its calyx as free, and states that an adherence almost as complete exists in some species of *Olax* The gamopetalous corolla he regards as a character of little consequence in orders where the æstivation is valvate, and as existing to a considerable degree in *Olax* itself In *Schœpfia* the stamens are more closely adherent to the corolla, but the filaments are filiform and prominent from the base of the latter, and are not confounded with its substance

He states *Cansjera* to differ from *Thymeleæ* to which it is usually referred, in the nature of the floral envelopes, in the position of the stamens, and in the structure of the ovary and of the fruit and adds, that in all these points it agrees with *Opilia*, from which it differs only in the adherence of its petals

The genera *Apodytes*, *Leretia* and *Pogopetalum* are characterized as follows

APODYTES

Flores hermaphroditi *Calyx* parvus, immutatus *Petala* 4, 5 *Stamina* totidem, iis alterna, sterilia nulla *Ovarium* 1-loculare *Fructus* ovatoreniformis, subcompressus, hinc appendice carnosa auctus *Inflorescentia* terminalis

LERETIA

Flores hermaphroditi, v abortu masculi *Calyx* parvus, immutatus *Petala* 5, intus villosa *Stamina* totidem, iis alterna, sterilia nulla *Ovarium* 1 loculare *Fructus* (ex icone Fl Flum) depresso-globosus *Inflorescentia* axillaris, laxa

POGOPETALUM

Flores hermaphroditi *Calyx* parvus (fructifer parum auctus ?) *Petala* 4, 5, intus villosa *Stamina* totidem, iis alterna, sterilia nulla *Ovarium* 3 loculare *Fructus* depresso globosus ? *Inflorescentia* axillaris, densa

Of the latter genus two species are characterized

P orbiculatum foliis ovato orbiculatis obtusissimis subtus ramulisque incanis, ovario hispido —A shrub ten or twelve feet in height, found in dry Savannahs on the Padawire River, *Schomburgk*

P acuminatum, foliis ovatis oblongisve acuminatis subtus vix pallidioribus ovario glabro —A tree of about thirty feet high, growing on the high banks of the Rio Negro, *Schomburgk*, n 970

Mr Bentham suggests that the three tribes above characterized may perhaps when better known be considered as distinct orders He thinks however, that the species of *Olax* in which the dissepiments of the ovary are almost entirely obliterated form a transition to *Opilieæ* that *Gomphandra* connects *Opilieæ* with *Icacineæ*, and that *Pogopetalum* is in many respects equally allied to *Olaceæ* and to *Icacineæ* He states that *Olaceæ* approach most nearly to the polypetalous orders with which *Olacineæ* have been compared but he cannot admit of the supposed affinity between them and *Aurantiaceæ* *Humiriaceæ* are, he thinks, among Dichlamydeous plants, those which come nearest to *Olacineæ* and he considers *Styraceæ* (including *Symploceæ* and *Halesiaceæ* of Don) to be very near both to *Humiriaceæ* and *Olacineæ* *Corneæ* and some other albuminous orders have also, in his opinion, some relation to them, but much more distant

He considers the nearest approach to *Santalaceæ* to occur in the tribe *Opilieæ*, where the calyx is reduced to little more than a dilatation of the torus, and if it be admitted that there are true Santalaceous genera with a superior ovary, and if he is right in supposing that in the young buds of *Opilia* and *Cansjera* there is more than one ovule these two genera become so nearly intermediate in his opinion, between *Olaceæ* and *Santalaceæ*, as to have nearly as much claim to be associated with the latter as with the former

Lastly, he states that *Icacineæ* recede from the two other tribes in the adherence of the placenta to one angle of the ovarium, and in the seed being consequently pendulous and not erect a circumstance which would have led him to propose it as a distinct order, were it not for the remarkable resemblance in the floral parts to some true Olacineous genera, and the absence of any other distinctive character of importance

In the notes to the paper Mr Bentham characterizes several undescribed species of *Olax* in the following terms

O nana (Wall Cat Herb Ind n 6783) suffruticosa? glabriuscula, ramis erectis parce ramosis, foliis subsessilibus oblongis lanceolatisve obtusis vix mucronulatis, pedicellis axillaribus solitariis 1-floris, calyce libero, staminibus sterilibus bifidis —Napalia? *Wallich*

O acuminata (Wall l c n 6781), fruticosa scandens? glabra, ramis angulatis, foliis ovato-lanceolatis acuminatis, racemis brevibus distichis paucifloris, calyce toro incrassato basi breviter adnato, staminibus sterilibus bifidis —Sillet, *Wallich*

O macrophylla, glaberrima, foliis ovato-lanceolatis acuminatis inæquilateris, racemis axillaribus brevibus distichis, calycibus glabris ovarii basi adnatis margine libero truncato, staminibus sterilibus integris v vix emarginatis, ovario glabro —In Monte Padawan Guianæ Anglicæ, *Schomburgk*

O pauciflora, foliis ovatis junioribus ramulis pedicellisque puberulis, pedunculis axillaribus 1—3 floris, calycibus molliter pubescentibus ovarii basi adnatis margine libero brevissimo truncato, staminibus sterilibus longe bifidis, ovario villoso —Serra Acurua Provinciæ Bahiensis Brasiliæ *Blanchet*, n 2795 —An huc *Dulacia singularis*, Vell Fl Flum?

January 19, 1841 —Mr Forster V P, in the Chair

Mr Mann, F L S, exhibited a specimen of *Sedum Telephium*, which had been preserved for two years in his Herbarium and still continued to send forth buds

Mr Babington F L S, exhibited some Fir cones taken from beneath about ten feet of solid peat at Burrishoole, near Newport, co Mayo, where they were accompanied by nuts of *Corylus Avellana* He stated that the trees in that part of Ireland had all been destroyed for about 200 years and that no individuals of either species now occur within very many miles except a few planted of late years and far from this locality Professor Don remarked that the Cones differed from either of the varieties of *Pinus sylvestris* at present found in Scotland, and that they so entirely resembled those of the alpine form of that species figured by Jacquin under the name of *Pinus Mughus* as to leave but little doubt of their identity He added that he regarded *Pinus Pumilio* as only another form of the same species

Read, "A Description of a new genus of *Lineæ*" By Charles Cardale Babington, Esq, M A F L S

This genus which Mr Babington regards as assisting to establish more fully the relationship of *Lineæ* to *Malvaceæ* is stated to differ from the usual structure of *Lineæ* by its imbricated and not contorted petals, which are also not unguiculate, although slightly attenuated below and by the remarkably thick coats of its one-seeded perfectly closed carpels Its essential character is given as follows

CLIOCOCCA

Sepala 5, integra *Petala* 5, in æstivatione imbricata *Stamina* 5 *Capsula* 10-locularis, *loculis* clausis indehiscentibus

The plant on which the genus is founded was raised in the Cambridge Botanic Garden from seeds gathered in the interior of New

South Wales by Mr Melluish, and has flowered there during three successive years

Read also, " Extracts of Letters from Wm Griffith, Esq , F L S , to R H Solly Esq , F L S '

In the first of these letters dated from Olipore April 8th, 1840, Mr Griffith states that he had recently examined two species of *Ephedra* and had no doubt that the ovulum is, as described by Mr Brown naked The first of these species has a very siliceous stem without stomata, unless certain discs blocked up with some hard matter (silex ?) are to be so considered which he believes to be the correct view, inasmuch as the other species, which has no siliceous deposit, has stomata of the ordinary structure arranged in a similar manner

He had also examined the ovaria of some Orchideous plants, in which he found, in conformity with Mr Brown's observations, that the cords sent down to the placentæ and subdividing into branches, one of which passes on each side of each placenta, do not exist before impregnation He adds, that the size of the cords is certainly in proportion to the degree of solution of the pollinia by the stigmatic action

In another letter, dated April 23rd, Mr Griffith describes the ovule of the outer cell of *Callipeltis* ? (that of the inner being always abortive) as deriving its membranous covering from the inner layer of the ovarium The ovulum itself he states to be reduced to its nucleus, but otherwise exactly to resemble those ovula which have their foramen near the hilum The same structure, he adds, exists in the two species of *Galium* found in the neighbourhood, the seed having no proper covering except the albumen and embryonary sac, its proper coat adhering intimately with the free inner layer of the ovary and this again adhering slightly with the calycine layer of that organ

In another letter, dated from Cabul, July 23rd, 1840, Mr Griffith alludes to the mode of attachment of *Cuscuta* and *Orobanche* *Cuscuta* he says differs in this respect but little from *Loranthus* the suckers stop at the first completely-formed wood, and never penetrate further, and both the cortical and ligneous systems pass into the stock In *Orobanche*, which, however, he has only slightly examined, the attachment seems to him to be made only by a bundle of ducts derived from the outer part of the central system, which spread out into a disc over the surface of the first completely-formed wood they meet He states the *Cuscuta* examined to be a gigantic species in extent, infesting willows, poplars, a species of *Elæagnus* and the *Alhagi Maurorum* It also preys he says, extensively on itself, and one of its intricate masses, half covering a willow-tree twenty or thirty feet high, presents a remarkable spectacle

February 2 —Mr Forster, V P , in the Chair

Read a paper " On a peculiar kind of Organs existing in the Pitcher of *Nepenthes distillatoria* " By Prof Don, Libr L S

These organs, named by Prof Don ' clathrophores,' occupy the lower half of the inside of the pitcher, and have been described by

Treviranus, Meyen and Korthals. Doubts still exist as to their precise function; but it appears to him probable either that they are the mouths by which the fluid is poured out into the pitcher, or that they are connected with the function of respiration.

He thinks with M. Morren that the pitcher originates from the lamina of the leaf, the margins of which become united at an early period; while he regards the operculum as formed upon the plan of the cucullate sepal and petals of *Aconitum*, and derived from the apex of the leaf. He regards the pitchers of *Sarracenia* as formed upon the same principle; but compares those of *Cephalotus* to the labellum of *Cypripedium*, the modified leaf being produced anteriorly into a pouch, and the operculum being posterior, and not anterior, as in *Nepenthes*.

The cuticle of the upper surface of the expanded part of the petiole of *Nepenthes distillatoria* is described as destitute of stomata, that of the under surface as being furnished with numerous oval, or nearly orbicular stomata, composed of two semicircular cellules with rectilinear faces. That of the outer surface of the pitcher is also without stomata, but covered, especially in the young state, with long subulate hairs, frequently dichotomous, or furnished with a spur-like process at their base. The outer surface of the operculum is sparingly furnished with stomata, and clothed with hairs which are frequently branched and fasciculate; the inner has no stomata, but is furnished with clathrophores and clothed with hairs, which are often fasciculate, but mostly simple.

In *Sarracenia purpurea* the cuticle of the pitchers is described as consisting of sinuously-lobed and somewhat stelliform cellules with numerous small, oval, closed stomata. The fibrous bundles are stated to be composed entirely of long pleurenchyma, the parenchyma adjacent to which consists of beautiful spiral cellules. The hairs of the inner surface of the operculum are simple, hollow, reflexed, subulate, and marked with numerous longitudinal parallel lines or striæ; they proceed from a somewhat elevated base. In the pitchers of *Cephalotus* the stomata are large, oval and closed; the spiral vessels smaller than in *Nepenthes*, and containing only a single fibre; and the hairs which form the fringed border are simple, obtuse and transparent.

Read also "A Descriptive Catalogue of the *Gramineæ* and *Cyperaceæ* contained in the Indian Herbarium of Dr. Royle." By C. G. Nees von Esenbeck, M.D., F.M.L.S., President of the Imperial Leopoldino Caroline Academy Naturæ Curiosorum.

The following are the characters of the new genera described in this paper.

Trib. SACCHARINEÆ.

LEPTATHERUM, *Nees*.

Spiculæ in rachi ad articulos barba cinctâ geminæ, homogamæ, hemiologamæ, altera sessili, altera pedicellata, utraque setigerâ. *Glumæ* duæ, herbaceo membranaceæ, acutæ; inferior dorso canaliculata, quadrinervis; superior carinata trinervis. *Flosculi* univalves membranacei: inferior neuter, muticus; superior linearis, canaliculatus, apice trans-

iens in setam longam capillarem apice subcirrhosam non genuflexam *Lodiculæ* 2, obconicæ, plicatæ, truncatæ, ovario breviores, membranaceæ *Stamina* 3, filamentis capillaribus *Styli* basi conjuncti, graciles, stigmata villosa *Caryopsis* libera, lanceolata, acuta *Inflorescentia* *Spicæ*, rachi continuâ, triangulari, glabrâ, solis spicularum insertionibus barbulatis, fasciculatæ, laxæ —*Herba*, habitu Panici Sectionis Digitariarum *Culmus* racemosus, adscendens *Vaginæ* longæ *Folia* lanceolata, acuta, plana, lætè viridia, nervo albo *Ligula* nulla

L Royleanum, Nees

BATRATHERUM, *Nees*

Spiculæ in rachi articulatâ geminatæ, heterogamæ, alterâ sessili hermagamâ, altera pedicellata neutrâ *Glumæ spiculæ* perfectæ 2, subæquales, herbaceo-chartaceæ, acutæ, apiceve acute bidentatæ, in aliis superior apice setacea, inferior plana, 2—6 nervis, superior carinata, complicata, 1—3-nervis, a dorso plicata canalem struens, in quo seta flosculi continetur, margine tenui simpliciter connivente *Flosculi* membranacei glumis breviores, nunquam saltem longiores, inferior neuter, 1-valvis, muticus, superior bivalvis, valvulâ inferiori acuminatâ apice minute bidentata prope a basi emittente setam in medio geniculatam infernè tortam, superiori exiguâ lineari-subulatâ bidentatâ quandoque nullâ *Lodiculæ* latæ, membranaceæ, truncatæ, dentatæ, plicatæ, in semicirculo singulæ singulum floris latus ambientes *Stamina* 3 *Stigmata* villosa *Styli* discreti *Spicula* pedicellata angustior, subuniglumis *Gluma* plana acuta nervosa, margine subtilius serrulata, superior gluma et flosculi rudimentum minuta, rotundata, squamiformia *Inflorescentia* *Spica* parce dichotoma, ad genicula magis minusve barbata *Pedicelli spicularum sterilium* ciliati —*Gramina* repentia, ramosa, foliis brevibus amplexicaulibus *Stipulæ* membranaceæ, exsertæ

B micans, Nees

APOCOPIS, *Nees*

Spiculæ in rachi angusta barbulatâ subgeminæ muticæ, alterâ rudimentali pedicellari, alterâ polygama sessili *Glumæ* truncatæ, inferior lata, plana, obovato-conica, coriaceo-chartacea, 8—9-nervis, lævis, apice minute bidentata et inter denticulos subciliolata, basin versus firmior et colorata, superior ovata, apice angustior denticulataque, chartacea, marginibus inflexa lævis, quinquenervis *Flosculi* 2, membranacei, bivalves, mutici, inferior masculus valvulis æqualibus, apice truncatis denticulatis, dentibus aliquot magis distantibus *Stamina* 3, antheris angustis, fulvis *Lodiculæ* exilissimæ, quandoque omninò nullæ quandoque denticuliformes acutæ *Flosculus* superior hermaphroditus, vel potiùs hermaphrodito-femineus *Valvula* inferior paulò firmior reliquis et colorata, apice truncato-bi-tri-denticulato, superior brevior, latiùs truncata ciliolato-denticulata *Lodiculæ* nullæ, aut forsan, ut in masculo, exilissimæ *Stamina* 3, eo tempore quo flosculi masculi stamina antheris perfectissimis filamentisque nondum elongatis intra valvulas adhuc latent, *jam* maximè extenuatis filamentis antheris autem nullis residuis extra valvulas prominentibus, conspicua *Ovarium* lanceolatum, in stylum simplicem, mox bifidum, transiens *Stigmata* longa, linearia, brevi-villosa *Spiculæ neutrius vestigia* produntur pedicello, spiculæ fertili adjecto, ciliato, mutilo *Inflorescentia* *Spica* bifida aut geminata, articulis trigonis ciliato-hirsutis ad genicula longiùs barbulatis —*Gramen* tenerum, gracile, ramosum *Nodi* glabri *Vaginæ* arctæ *Folia* plana, lineari acuta

A Roylianus, Nees

Trib STIPEÆ

ORTHORAPHIUM, *Nees*

Spiculæ unifloræ *Glumæ* duæ convexæ, chartaceo-membranaceæ, plurinerves *Flosculus* collo barbato hinc depresso-plano insertus, bivalvis, chartaceus *Valvula* inferior plurinervis, convoluta, apice attenuata in subulam continuam non articulatam neque contortam, superior brevior, binervis, dorso convexa *Lodiculæ* 3, membranaceæ, duæ anteriores lanceolatæ, ovarium æquantes, basi callo insertæ, posterior lanceolato linearis, ovario duplo longior *Stamina* 3, antheræ flavæ apice barbatæ aut nudæ *Ovarium* sessile, apice calloso-incrassatum *Styli* breves, basi contigui *Stigmata* plumosa *Caryopsis* libera * *Inflorescentia* *Panicula* angusta, ramis paucifloris —*Gramina* foliis angustis rigidis, cauda aristæformi spicularum mediocri rigidula scabra

O Roylei, Nees

Trib CHLORIDEÆ

MELANOCENCHRIS, *Nees*

Spiculæ sesquifloræ aut subtrifloræ, flosculo extremo rudimentali, in rachi propria brevi alternæ quidem, sed adeo approximatæ ut capitulum involucratum exhibeant, superiores rachillæ imperfectæ *Gluma* in infimis duæ, æquales, in superioribus quandoque in omnibus una (supera), bracteæformes, subulatæ, rigidæ, hirsutæ, flosculis longiores, basi membranaceo-marginatæ *Flosculi* perfecti duo, ubi gluma singula residet quasi axillares in angulo glumæ et rachillæ, quorum alter rachillæ propior, hermaphroditus, perfectus, sessilis, alter masculus vel neuter pedicellatus, tertius, ubi adest, rudimentalis, clavatus, nudo pedicello seu rachillæ apice indicatus *Valvula* duæ, membranaceo-herbaceæ, inferior trinervis, apice bifida, laciniis æqualibus lineari-subulatis, vel bifida cum setâ interjectâ, superior æquè longa, plana, binervis apice bifida *Flosculus* superior conformis, sed minor *Lodicula* breves, subquadratæ, bidentatæ, glabræ *Stamina* 3 *Anthera* luteæ *Ovarium* oblongum, compressum, læve, truncatulum *Styli* longi, late discreti filiformes *Stigmata* angusta, dissite brevi puberula *Caryopsis* libera *Inflorescentia* *Spicæ* partiales, forma involucrorum Cenchri aut Penniseti, in rachi communi flexuosâ alternæ, secundæ, paucæ, nutantes racemulum exhibent —*Gramina* perennia, parva, polyphylla, ramosa *Folia* brevia, rigidula *Ligula* nulla *Racemus* exsertus, gracilis, secundus, laxus *Setæ* flosculorum coloratæ

1 *M Royleana*, Nees
2 *M Rothiana*, Nees
Pomereulla monoica, *Roth*

Trib FESTUCEÆ

PLAGIOLYTRUM, *Nees*

Spicula multiflora *Glumæ* duæ, spiculâ breviores, inferior minor amplectens, oblique acutata, altero latere subpræmorsa, superior bidentata, et inter dentes brevi subulata, subulâ dentes æquante, e nervi dorsalis geminati apice unito ortâ *Flosculi* in axi gracili ad genicula barbulata imbricati, bivalves *Valvula* inferior ovata, lateribus incurva, herbacea, trinervis, apice bilaciniata laciniis muticis, setis tribus strictis, e nervo medio duobusque lateralibus proficiscentibus interjectis, superior oblonga, magis membranacea, sursum plana, in apice obtusiusculo bifida, inferius convoluta, referens flosculum ligulatum Synan-

therceæ, subquadrinervis, nervis duobus marginibus proximis distinctis, mediis obsoletis *Lodiculæ* 2, coloratæ, conicæ, truncatæ, glabræ, angustæ *Stamina* 2 (?) *Filamenta* capillaria *Ovarium* cylindricum, glabrum *Styli* filiformes, distantes *Stigmata* laxè villosa *Caryopsis* elongato cylindrica, compressiuscula, truncato-bidenticulata *Inflorescentia* *Spica* simplex, disticho-subsecunda —*Gramina* erecta, foliis angustis, ligulâ brevi

1 *P* *calycinum*, Nees
Dineba calycina, *Hb* *Wight*
2 *P* *filiforme*, Nees
3 *P* *unidentatum*, Nees

Many new species belonging to genera previously established are also characterized and described

February 16 —The Bishop of Norwich, President, in the Chair

Read "Observations on some new or little-known species of *Polyparia* found in the supercretaceous strata of Italy" By Signor Giovanni Michelotti of Turin

March 2 —Mr Forster, V P in the Chair

Read a "Description of a new genus of Plants from Brazil" By John Miers, Esq , F L S

The following are the characters of the new genus described —

TRIURIS

Flores dioici *Perianthii foliola* 3, obovata, infra apicem processu longo instructa ♂ *Antheræ* 3? sessiles, loculis disjunctis, imo androphoro magno carnoso centrali insertæ ♀ *Pistilla* numerosissima, aggregata, supera *Styli* simplices, subulati *Fructus* ignotus —Planta *pusilla hyalina*, foliis *paucis bracteiformibus*

T *hyalina*
Hab in humidis Serra dos Orgãos Provinciæ Rio de Janeiro

Mr Miers observed this minute plant only in a single locality, and was unable to find ripe fruit He perceived, however, in each pistillum what appeared to him to be a solitary ovule, but so minute and indistinct as to be evident only by the appearance of a darker oval form in the centre He has consequently no positive evidence whether it is Monocotyledonous or Dicotyledonous but is induced by various considerations to refer it to the former class He notices the points in which it appears to him to bear some resemblance to different Monocotyledonous families, and suggests that, as it cannot be distinctly referred to any of them, it may probably be taken as the type of a distinct order, holding a place between *Burmanniaceæ* and *Fluviales*

The processes which are noticed in the character as arising from below the apices of the divisions of the perianthium, are described as capillary tubes three times as long as the segments, within which they are coiled up during æstivation, their apices exhibiting at the apex of the bud three minute pore-like apertures open externally

GEOLOGICAL SOCIETY

March 11, 1840 —A paper was read, "On the Siliceous Bodies of the Chalk, Greensand and Oolites," by Mr Bowerbank, F G S

The author commences by stating, that naturalists and geologists have long considered the form of tuberous masses of flint found in the upper chalk to be due to alcyonia or sponges, but that he is not aware of this opinion having been proved to be correct It was Professor Ehrenberg's observations on siliceous bodies which first induced him to obtain thin slices of flint with the intention of procuring specimens of Xanthidium In the examination of these slices, he was struck with the frequent occurrence of patches of brown, reticulated tissue, spicula, and Foraminifera, and he was induced to infer, that the patches of tissue were the remains of the organized body, possibly a sponge, to which the flint owed its form With this belief, he commenced his inquiries by examining thin slices of flints obtained from various localities, and he found in all of them a perfect accordance in the structure and proportion of reticulated tissue, in the number of spicula, and in the occurrence of Xanthidia and Foraminifera The following are the general appearances which the slices of flint exhibit when mounted upon glass

With a power of about 120 linear the slice presents the appearance of a stratum of a turbid solution of decomposed vegetable or animal matter containing Foraminifera, spicula, Xanthidia, and frequently fragments of the brown tissue In a specimen from Northfleet the mass of the spongeous portion exhibited numerous cylindrical contorted canals, which from their uniformity and minuteness of diameter, Mr Bowerbank considered to be the incurrent canals of the sponge, and other orifices of greater diameter to be the excurrent Very frequently, when little of the reticulated substance of the sponge remains, its former presence, the author says, is indicated by the siliceous matter resembling a congeries of gelatinous globules, moulded by the tissue amid which it was deposited, and the globules, when traced to the edges of the patches of spongeous texture, were found to agree in size and form with the orifices of the supposed incurrent canals In cases where no traces of the sponge can be detected, Mr Bowerbank thinks, that the mode in which the spicula, Foraminifera and other extraneous matters are dispersed equally in all parts, and not precipitated to one portion of the flint, indicates that the organized tissue in which they were entangled, retained its form and texture sufficiently long to allow of the fossilization of these remains in their original places, and that the nature and position of these bodies strongly indicated the former spongeous nature of the flint.

When the chalk is carefully washed from the exterior of a flint, and a portion examined as an opake object with a power of about fifty linear, it exhibits a peculiar saccharine appearance, with deep circular excavations, having fragments of extraneous matters partly imbedded or adhering to them If the surface be further cleansed by immersion in diluted muriatic acid, till effervescence ceases, spicula may be detected on the sides of the deep circular cavities, and if, again, a piece a quarter of an inch in diameter, presenting the roughest aspect, be examined under a power of 120 linear, illuminated by a Lieberkuhn, the surface, under favourable circumstances, will present a complex mass of small, contorted tubuli, occasionally furnished at the apex with a minute perforation

The structure and other characters of the tabular flints are stated to accord perfectly with those of the nodular masses, except that the under surface has a still more marked spongeous aspect, and that spicula and Foraminifera are more abundant The absence of any apparent base or point of attachment in the great mass of nodular chalk flints, the author says (considering them undoubtedly of spongeous origin), may be accounted for by supposing that the gemmule was originally attached to some minute fragment of a shell or other substance, and that its further development took place while recumbent on the mud or silt.

The perpendicular and oblique veins of flint between Brighton and Rottingdean, are reported to present exactly the same internal characters as the tabular and nodular flints, and to agree externally with the former The occasional existence of a fissure filled with chalk, in the centre of the vertical layers, Mr Bowerbank conceives, may indicate that the sponge had grown from the two sides of the crevices, but had not in all places been able to unite The sides of these flint veins are not studded with Foraminifera in a manner similar to that of the tabular horizontal layers

Mr Bowerbank next examined the flint with which Echinites and shells of the chalk are often entirely or partially filled and enveloped, and he states, that the results were the same, both with reference to the exterior and the interior of the flint In those cases in which the Echinite is only partially filled, he infers that the portion so occupied was originally a sponge, because its surface is uneven, for had the flint been deposited in an empty shell or Echinite, it would present an uniformly flat surface Again, he states, that the projecting of the flint through the two openings of the Echinite, with an extension to a greater or less distance, is owing to the sponge having grown outwards through these orifices, and the envelopment of an organic body by a tabular mass of flint, he explains by reference to the habit of recent sponges to invest testacea or other marine bodies In some cases, he has found minute but deep depressions on the surface of flints filling Galerites, and immediately opposite to the ambulacral pores, and he ascribes the origin of the depressions to streams of water drawn in through the orifices to supply the wants of the living sponge.

Mr Bowerbank was afterwards induced to extend his examination to the flints which invest the zoophytic bodies of the Wiltshire chalk. By carefully cleaning the interior of some of these flints, he discovered spicula projecting from all parts, however different the character of the inclosed body, and the spicula appeared to have no reference to it, none of them being found on its surface Under the microscope, the investing flint presented in every respect the same appearance as that exhibited on the lower surface of the tabular flints, having fragments of minute corals and small shells attached to the inner surface. A thin slice exhibited the usual organic contents of the common flint. He, therefore, infers that the tabular flint which incloses the zoophytes, owed its origin also to a sponge which invested the organic nucleus.

A comparison of the characters presented by the spongeous remains of the flint, with a collection of recent sponges, has induced Mr. Bowerbank to conclude that the fossils cannot be referred to any of the established divisions of existing sponges.

On examining the cherts of the greensand of Fovant in Wiltshire in the same manner, he found that the only differences between them and chalk flints, existed in the coarser texture of the spongeous fibre, the greater size of the interstices of the network, and the larger dimensions of the imbedded extraneous bodies. The cherty nodules of the upper greensand of Shaftesbury afforded similar appearances. A black, semi transparent nodule, with an outer coat resembling agglutinated sand, was found under the microscope to contain numerous contorted canals of various sizes, and a considerable number of beautiful green spicula. Two chert casts of Spatangi from Shaftesbury afforded results analogous to those obtained from chalk Echinites.

Slices from a great variety of the greensand cherts of Lyme Regis presented characters which agreed with the cherts of Fovant. A specimen of flint from the Portland stone of Tisbury, and another from Portland, gave a greater quantity of cellular structure than any of the previously noticed cases, and the texture bore a greater affinity to that of the freshwater sponge than is exhibited in the flints of the chalk or the cherts of the green sand.

With respect to the causes of the deposition of the flint, Mr. Bowerbank objects to the supposition, that it was influenced by the siliceous spicula of the sponges, because the flint is in no case limited or determined by their immediate presence, but is, in all instances, bounded by the extent of the animal matter of the sponge. He has frequently observed that the large excurrent canals in the chalk flint spongites are not filled with silex, and that the spicula projecting into them have not the slightest incrustation of siliceous matter upon their surface, while on the contrary, wherever a single tube or a thin layer of tubes has been projected from the mass into the chalk, the silex has been attracted to it. He conceives also, that the retention of the spicula and extraneous matters in all parts of the flint, may be accounted for, by supposing that the animal matter was the attractive agent, acting equally throughout the whole body of the sponge. In support of his argument he adduces the siliceous shells of Blackdown, and the siliceous corals of the Tisbury oolite and the mountain limestone, which contain no spicula, and in which it cannot be supposed that previously existing siliceous matter was the attractive agent. Lastly, the pyritous fossils of the London, Kimmeridge, Oxford and other clays, are also mentioned as examples of animal and vegetable substances having exercised an attractive influence.

ZOOLOGICAL SOCIETY

August 11, 1840 —R C Griffith, Esq , in the Chair

A paper entitled ' Description of Shells collected and brought to this country by Hugh Cuming Esq , by W J Broderip Esq , F R S , etc , was read

" Mr Cuming " observes the author, " the fruits of whose western voyage are so well known left England on the 26th of February, 1836 he proceeded to the Philippine Islands, by the permission of the Queen Regent of Spain and aided by powerful recommendations from her government which opened to him the interior of the islands and caused him to be received with a noble hospitality, equalled only by the warm interest which facilitated his pursuits wherever he arrived and made himself known

" Mr Cuming visited the whole group His longest stay was in the island of Luzon fifteen provinces of which were well ransacked by him In the islands Mindoro, Negros Panay Siquijod Zebu, Bohol, Camiguing Mindanao Leyte, Samar, Capul Ticao Masbate, Burias, Temple, Marinduque, Maracavan and Ramblon, he reaped a fine harvest He left the Philippines in November 1839, proceeded thence to Sincapore and Malacca, and returned to England in June, 1840 bringing with him besides the living animals which he has liberally presented to this Society a grand collection of zoological and botanical specimens, including more than three thousand species and varieties of shells, the greater part of which appear to be new to science, and among them are several new genera The smaller islands were particularly rich in the pulmoniferous mollusca which were found by Mr Cuming principally in deep forests We commence a notice of the labours of this active and zealous collector, with an attempt to describe a few of these terrestrial species Mr G B Sowerby who liberally gives up his valuable time to assist in laying before the public the novelties of this part of the collection will also begin his share of the task by describing another branch of the same numerous family and it is intended to submit descriptions to the Society from time to time till the whole of Mr Cuming s stores are exhausted

" Before, however, we commence our task, I must, in justice to him who has placed the materials in our hands, observe, that, to say nothing of the variety of new forms which he has been the means of bringing to light, those who cultivate this branch of zoology so highly interesting to the geologist as well as the physiologist owe him a large debt of gratitude, for information on a point of no small zoological importance It is not very long since that the localities ascribed to shells could in very few instances be depended upon The cupidity of dealers some years ago not unfrequently prompted them wilfully to deceive those who gave extravagant prices for new shells on this point, and carelessness was generally the order of the day Mr Cuming, by his accurate notes, and the open publication of the places where every one of the multitudinous species and varieties collected by him was found, has mainly assisted in making a complete revolution in this department of the science, and has done more towards giving us data for the geographical distribution of the testaceous mollusca than any person who has yet lived.

' HELICIDÆ.

'When we consider what the genus *Helix* was when Linnæus wrote, and what it now is, we must be struck with the flood of new species which has been poured in upon us of late years. Already the vocabulary has been so drawn upon, that the mere finding names for the new species is attended with no small embarrassment, whilst the limits of each species are daily more difficult to fix. When a few forms only in a great natural group are known, they are easily defined. It is where multitudes are placed before the zoologist, marked with every variation that food and temperature and locality can impress upon them, that it becomes no longer easy to solve the problem, Which is a species and which is a variety? Then it is that the pregnant question 'What *is* a species?' comes home to the mind. But our business now is to define as well as we can those forms which have been laid before us, and which to us at least are new. When the whole of the additions to this great tribe existing in Mr. Cuming's collection have been studied, we shall perhaps have materials for something like a complete natural arrangement of the group.

Genus BULINUS.*

BULINUS MINDOROENSIS. *Bul. testâ ovatâ, ventricosâ, subpronâ, anfractibus sex, ultimo longè maximo, lineis incrementi obliquè striatâ; aperturâ subrotundâ; columellâ lata, labio expanso.*

Var. *a. valdè ventricosa, sordidè brunnea, strigis irregularibus longitudinalibus varia; aperturâ subalbidâ; labio nigro-brunnescente.*

Hab. ad Puerto Galero in insulâ Philippinâ Mindoro dictâ.

Legit H. Cuming in sylvis.

Var. *b. Pallidior, coloribus distinctioribus; fasciâ suturali brunneâ interruptâ; anfractu ultimo fasciâ brunneâ strigis longitudinalibus interruptâ cincto; labii margine castaneo rufescente.*

Hab. ad Mansilai in insulâ Mindoro.

Legit H. Cuming in sylvis.

Var. *c. Gracilior, longitudinaliter brunneo et flavo sordido striata.*

This comes very near in colouring, and approaches somewhat in the shape of the aperture, to the two first varieties of *Bul. chrysalidiformis.* The markings of the young shell remind the observer of the eggs of some of the Plovers, and the shape assists the delusion.

Hab. ad Puerto Galero in insulâ Mindoro.

Legit H. Cuming in sylvis.

Var. *d. Sordidè flavescens, creberrimè longitudinaliter corrugata et strigata.*

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* "I have elsewhere (Zoological Journal, vol. iv. p. 222) given my reasons for writing Buli*n*us instead of Buli*m*us. Adanson's *Bulin* was a *Physa*, and the word, however written, is very inapplicable to the forms to which Bruguière, Lamarck and authors generally have applied it."

A brilliant *chatoyant* reflection like Labradorite is to be observed on the polished surface of the dark brown reflected part of the outer lip in fresh specimens

Var *e* *Subnana, gracilior strigis et coloribus distinctioribus clarioribus*

Hab ad Puerto Galero

Legit H Cuming in sylvis

This variety was the most abundant and Mr Cuming informs me that he detected it in the act of depositing its eggs on the leaves of trees in the forest where it was feeding The eggs which are white, oblong and covered with a hard, granular shell, were attached to the leaves by a gummy substance They are half an inch long and nearly four-twelfths across in their widest part

Var *f* *Anfractu ultimo nigrescente, antice flavo subsordido strigata vel maculata fasciâ nigrescente basali*

Hab ad Puerto Galero

Legit H Cuming in sylvis

In this variety the abrupt termination of the yellowish markings toward the basal portion of the body-whorl leaves the dark colour almost uninterrupted in the shape of a dark band

Var *g* *Strigis distantibus anfractu basali erga basin cincturâ moniliformi interruptâ, albida vel flavescente ornato*

Hab ad Mansalai in insulâ Mindoro

Legit H Cuming in sylvis

Var *h* *Pallida strigis latis anfractu ultimo fasciâ pallidiori subbasali cincto*

Hab ad Mansalai

Legit H Cuming in sylvis

Var *i* *Strigis irregularibus angulatis frequentibus tota picta*

Hab ad Mansalai

Legit H Cuming in sylvis

Var *k* *Cinereo subvirescens strigis pallidis angulatis, distantibus, brunneo-marginatis obscure ornata, anfractu basali fasciâ brunneo-rufescente subbasali cincto*

Hab ad Puerto Galero

Legit H Cuming in sylvis

Near the *umbilicus* the *epidermis* in those specimens of var *k* which I have seen is worn off, exposing the rich red brown ground colour of the shell Indeed in all the varieties the dark colour generally appears to reside in the shell itself and the lighter-coloured markings with few, if any exceptions, in the *epidermis* In the largest variety (*a*) here described, the effect of the detrition of the *epidermis* is well shown Var *k* comes very close upon var *c* of *Bulinus chrysalidiformis* The length of this species is 6 inches and under, and the breadth from about 1 to $1\frac{1}{8}$th of an inch

BULINUS CHRYSALIDIFORMIS *Bul testâ valdè productâ, subpupiformi, subcylindricâ, lineis incrementi obliquè rugosâ, aperturâ subauriculiformi, distorta, columellâ subrectâ, amplâ, complanatâ,* *peristomate interrupto, labio interno expanso labio externo expanso, subrecurvo, sæpiùs subconstricto, umbilico subobsoleto*

Var *a* *Subgracilis, anfractibus 7 subventricosis, ultimo vix subventricosiori, pallidè castanea vel brunnescens strigis longitudinalibus irregularibus sordidè flavis picta, aperturâ intus subalbidâ, labio nigro-purpurascente*

This variety is curiously marked In the young shells the colours are more pure and distinct but as the animal becomes aged they are more confused, and run into each other In both states the upper whorls are transparent, and the two last opaque

Var *b* *Pallidior, labio haud constricto, ex albido dilute purpurascente*

Hab ad Puerto Galero

Legit H Cuming in sylvis

The distortion and a shade of the constriction may be traced in the mouth of this variety

Var *a* et *b* habitant ad Puerto Galero

Legit H Cuming in sylvis

Var *c* *subflava, anfractibus ventricosioribus, fasciâ suturali albidâ et subpurpureâ tessellatâ, aperturâ amplâ, albâ labii margine castaneo-purpurascente*

The shells of this variety are much less thick than those of the two first, and are nearly transparent throughout, but it must be remembered that all which I have seen of this variety appear to be younger shells the body whorl is also much more ventricose in proportion

Var *d* *Tota flavescens, labio albo*

This variety, as well as the last, when held against the light, shows shadings of the longitudinal stripes

Var *c* et *d* habitant ad Mansalai

Legit H Cuming in sylvis

⁂ *Bulinus chrysalidiformis* of G B Sowerby (Zool Proc 1833 p 37) is a faded shell of var *c* or *d* It is without *epidermis* and entirely white except the margin of the lip which is brownish The length of this species varies from $2\frac{7}{8}$ths inches to $2\frac{2}{8}$ths, and the breadth from $1\frac{5}{8}$ths to $1\frac{1}{8}$th

"The shells which I have here attempted to describe were collected by Mr Cuming in deep and dark forests of thick foliage some upon, and others beneath, the leaves of trees There were no palms in these forests

"I cannot quit this group without acknowledging that I am not without doubts as to the specific difference of *Bul chrysalidiformis* and *Bul Mindoroensis* If the shells at the greater intervals be taken, they appear to be distinct, but there are gradations in these numerous and motley Mindoro snails that at least closely approximate the two sections into which I have divided them"—W J B

Mr Cuming exhibited the various species and varieties of shells described in the foregoing paper, and also a series to illustrate the memoir of G B Sowerby, Esq , which was next read it is entitled Descriptions of new species of the family of *Helicidæ*, collected by Mr H Cuming in the Philippine Islands "

HELIX (COCHLOGENA De F) POLYCHROA *Hel testa obovatâ tenui, nitidâ anfractibus quinque primis præsertim, ventricosis obliquè lineis incrementi striatis, ultimo majori cæteris duplo longiori, fasciâ diversicolore, plerùmque albâ prope suturam aperturâ suborbiculari peristomate plerumque albo extus reflexo , columellâ albâ, rectiusculâ, antice subcallosa, subsinuata* Long 1 9 lat 1 3 poll

H virido striata Lea secund Jay

Hab in foliis arborum ad insulam Temple dictam Philippinarum

One of the most beautiful as well as one of the most variable species in colour In its general form it is very near var *b* of Lamarck s *Helix galactites* (*H mirabilis* De F Hist Nat Gen et Part des Mollusques terr et fluv t 31 f 4 to 6) which has been called *H Philippinarum* but from which it may easily be distinguished by attention to the above characters The following seven varieties in colour have been brought by Mr Cuming viz var *a* bright green, with darker, longitudinal oblique slightly undulated lines and bands and a white band at the suture var *b* the same with the addition of a narrow very darkly coloured brown band immediately below the white sutural band and a broad spiral dark brown basal band var *c* the same with two additional dark brown bands on the last volution var *d* bright light brown, with green slightly undulated oblique longitudinal bands and a white sutural band var *e* the same as var *a* , but having the sutural band of a light and dark brown colour varied var *f* of chestnut brown with a white sutural band var *g* of a dark chestnut brown with a light orange brown sutural band

This species is *Helix virido-striata* of Lea, according to Dr Jay , I know not if that name be published or not I hope not, because it cannot be adopted neither being consonant with the rules of nomenclature nor with classic purity

HELIX (COCHLOGENA De F) FLORIDA *Hel testâ obovatâ, tenuiusculâ haud nitente, anfractibus quinque ventricosis, tenuissimè obliquè striatis ultimo majori cæteris ferè duplò longiori , suturâ minutissimè crenulatâ albâ aperturâ suborbiculari peristomate latiusculo, reflexo, rotundato albo , columellâ albâ, subincurvâ* Long 1 6, lat 1 1 poll

Hab in foliis arborum prope Munsolai ad insulam Mindoro Philippinarum

This, like the last, is a very beautiful species and it is also subject to much variation in colour , its varieties, nevertheless, are not so numerous It is principally remarkable for its surface being dull like the bloom upon green plums or grapes The following varieties are exhibited by Mr Cuming viz var *a* of an uniform green, becoming paler toward the apex, where it is white var *b* green, with a brown band close to the white sutural band, and the apex of a reddish brown var *c* green, with a dark brown band near the sutural band, and a dark brown spiral band close to the *columella* var *d* the same with two intermediate brown bands, both of which however, are not continuous var *e* brown with a dark brown band next to the sutural white band and the dark brown spiral band surrounding the *columella* In all these varieties the narrow white sutural band is constant, and the anterior part of the last volution within the aperture is yellower than the outer surface

HELIX (COCHLOGENA De F) HYDROPHANA *Hel testá obovatá, tenuiusculá nitidula anfractibus quinque ventricosis oblique tenerrime striatis ultimo majori cæteris duplò longiori omnibus plùs minùsve epidermide hydrophaná indutis, apertura suborbiculari peristomate albo rotundato reflexo, columella subarcuatá anticè in tuberculam indistinctam productá* Long 1 35 lat 1 05 poll

Hab prope Puerto Galero ad insulam Mindoro Philippinarum

The ground colour of this extraordinary species is brownish yellow and it has two three or four broader or narrower very dark brown spiral bands A rather thinner variety with three bands, is found in the island of Corregidor in the Bay of Manilla The most remarkable circumstance in its natural history is that it is more or less covered with a very thin opaque white *epidermis* which becomes transparent on being wetted the dark brown bands are then seen brilliantly contrasted with the yellowish brown general colour of the shell

HELIX (HELICOSTYLA De F) CEPOIDES *Hel testá suborbiculari tenui, spira subdepresso-conicá, anfractibus senis ventricosis, posticè depressiusculis lineis incrementi striatis, suturá distinctá, aperturá semilunari peristomate posticè tenui subreflexo tum crassiori reflexo, columellá in dentem obtusum producto* Long 1 8 lat 2 2 poll

H cepoides, Lea M S secund Jay

Hab ad insulam Luban Philippinarum

This species most nearly resembles *H unidentata* Lam Anim sans Vert VI pt 2 p 74 from which it may easily be known by its more ventricose volutions, and its much narrower aperture It differs also in colour, the *unidentata* being usually of a dark chestnut brown while in the *Dolium* the spire and more than the upper half of the last volution are of a light brown, and the remainder lighter coloured still, and between the darker and lighter colour is a band of nearly white The *epidermis* in this species is very thin and pale-coloured, and it has alternating darker marks close to the suture A variety occurs of a nearly uniform pale brownish yellow colour, though in other respects similar

I gladly adopt Lea's manuscript name of *cepoides*

HELIX (HELICOSTYLA ? De F) ARATA, *Hel testá ovatá, subcylindricá, crassiusculá, rufo-fuscescente fasciá antemedianá albidá, anfractibus senis, subventricosis, oblique exaratis, subrugosis, suturá distinctá, crenulatá, aperturá ferè circulari, intùs albá,*

peritremate expanso, subreflexo, fusco, columellâ albâ, umbilico mediocri Long 1 7, lat 1 1 poll

Hab ad insulam Tablas Philippinarum

Variat testâ omninò pallidè lutescente aperturâ peritremateque albis

The two varieties of this remarkable species differ so much in colour that they might at first sight be regarded as distinct species I do not, however discover any real difference in their conformation and therefore am compelled to unite them as varieties The ridges between the furrows vary greatly in their distance from each other, they appear to be more and more frequent as the shell increases in age

HELIX (HELICOSTYLA? De F) ADUSTA *Hel testâ oblongâ subcylindricâ, castanea, lævigatâ tenuissimè lineis incrementi striatâ, fasciâ antemedianâ pallidiori anfractibus senis subventricosis, suturâ distinctâ, aperturâ ferè circulari intus albicante, peritremate leviter expanso reflexo fusco, columellâ pallidâ, umbilico parvo* Long 1 8, lat 1 poll

Hab ad insulam Tablas Philippinarum

This species resembles the last in form as well as colour it differs however in its general proportions as well as in being entirely free from the numerous and deep oblique grooves so remarkable in that species its *umbilicus* also is smaller

HELIX (HELICOSTYLA? De F) BRACHYODON *Hel testâ ovato subcylindricâ tenui castaneâ fasciâ anticâ pallescente, anfractibus quinque ad sex subventricosis lineis incrementi tenuiter obliquè striatis, suturâ distinctâ, leviter crenulata, aperturâ suborbiculari, intùs albicante, dente obtuso antico, albo, peritremate subincrassato reflexo subexpanso, internè inter columellam dentemque sinuato, columellâ albâ obtusâ, umbilico parvo* Long 1 95 lat 1 3 poll

Hab in foliis arborum prope Puerto Galero ad insulam Mindoro Philippinarum

Variat testâ breviori, colore saturatiori striisque fortioribus Long 1 35, lat 1 2 poll

I have named this species *Brachyodon* from a short white tooth placed at the inner and anterior part of the lip and which appears to be constant I do not hesitate to regard the shorter specimens as merely a variety though they differ greatly in their proportions from the typical variety A single nearly colourless specimen is intermediate in its proportions

HELIX (COCHLOGENA De F) PULCHERRIMA *Hel testâ orbiculari, subglobosa, tenuiusculâ, haud nitente spira plerumque subdepressâ anfractibus 4½ ventricosis lævibus, striis solum incrementi tenuissimis insculptis, coloribus pulcherrime ornatis ultimo maximo cæteris quadruplò longiori, suturâ distinctè impressâ, apertura rotundato-semilunari, intùs albâ, peristomate latiusculo rotundato, reflexo, extus ad basin columellæ subsinuato columellâ dilatatâ, subplanulatâ* Long 1 5 lat 2 poll

Hab prope St Jaun in provincia Cagayan insulæ Luçon Philippinarum

The usual ground colour of this very pretty shell varies from a pale yellowish brown through orange brown, to dark chestnut brown some of its varieties are of a nearly uniform colour others are very elegantly varied with narrower or broader and more or less numerous interrupted bands of opaque white *epidermis* (which are transparent when wetted) and which gives them a very brilliant and captivating appearance to which it is indeed impossible in words to do justice

This species is usually about the same size as *Helix Pomatia* differing from that, however, very greatly in form and proportions, and varying moreover greatly in size It is nearly orbicular somewhat globose, with a slightly depressed obtuse spire It is of a thin substance and its surface is dull Its volutions are four and a half of which the first is rounded and the last is very large, being four times as long as the rest, and very ventricose, they are smooth, being closely covered with the very slender lines of growth the suture is very distinct inasmuch as that the posterior part of the next volution is nearly horizontal and the anterior part of the last volution nearly perpendicular to it The aperture is large (not so large in proportion as Deshayes's *Helix Cailliaudi* Mag de Zool 1839 Mollusques Pl 5) of a rounded semilunar form and white within the peristome is rather broad and thick rounded and reflected in some varieties it is quite white in others it is delicately coloured of a rose tint, and sometimes of a brownish red the *columella* is dilated and rather flattened usually quite white though occasionally tinged with rose

The following are the twelve principal varieties which have occurred to Mr Cuming, viz

Var *a* General colour dark chestnut brown, apex brownish scarlet edge of the peristome purplish crimson body covered with broader and narrower white interrupted bands set nearly close together

Var *b* The same only not having so many of the white bands, the ground colour is seen in broader bands

Var *c* General colour dark chestnut brown with numerous interrupted bands of light brown *epidermis*, apex brownish scarlet edge of the peristome purplish brown

Var *d* Ground colour orange brown, with numerous white interrupted bands, peristome white

Var *e* Dark chestnut brown, with only three or four light-coloured interrupted bands, so that the dark brown ground colour appears in broad bands

Var *f* Light yellowish brown with the apex red, and the edge of the peristome rose colour, numerous close set interrupted nearly white bands ornament this variety

Var *g* The same ground colour as the last, with a light buff-coloured edge to peristome and a single white scarcely interrupted band forming the circumference of the shell

Var *h* With a chestnut brown ground colour, a red apex, and orange coloured edge to the peristome, and one white band, forming the circumference

Var *i* With a chestnut brown ground, a red apex, and an orange-coloured edge to the outside of the pink edged peristome, and without any white band but a slender white sutural line

Var *k* With a yellowish brown ground colour, the apex and the back of the peristome bright orange-red, peristome and columella rose-coloured, without a band, but with a slender white suture line

Var *l* Of an uniform yellowish brown with white peristome

Var *m* Of an uniform pale brownish yellow with white peristome

The most beautiful varieties are most abundant on the leaves of bushes and young trees at St Jaun where also all the other varieties are found Some of the lesser painted varieties are also found at Abulug in the same province The species has not been found in any other part of the Philippine Islands

Since this paper was read two other varieties have been found by Mr Cuming in his packages, they are

Var *n* Of a very rich dark chestnut brown with a scarlet apex four very narrow interrupted white bands of *epidermis* a white suture, and orange coloured outer edge to the white peristome

Var *o* Of a rich light brown colour with a yellowish band forming the circumference of the shell and another band of the same yellowish colour in front near the *columella*, peristome white its edge pink, and back of the lip orange-yellow

MISCELLANEOUS

ZOOLOGICAL OBSERVATIONS MADE IN THE NEIGHBOURHOOD OF TENBY

BY J F DAVIS M D WITH A PLATE

To the Editors of the Annals and Magazine of Natural History

Bath, Oct 23rd, 1840

GENTLEMEN,—During a temporary sojourn at Tenby in August last I was induced to see a large fish in the possession of a publican and fisherman named Cadwallader, which he had taken in Tenby Bay the preceding autumn while employed in the capture of herrings It had been tolerably well preserved and was kept for exhibition being by no means destitute of attraction It measures ten feet in length and six feet in girth between the eyes two feet and a half, and has the appearance of belonging to the Sharks, but its most remarkable feature is the head, which, as Cuvier remarks of the Hammer-headed Shark, is unlike to anything in the whole animal kingdom besides It is a female, and when opened was found to contain a considerable number of young ones about eighteen inches long one of which is stuffed and exhibited with the mother Upon my return to Bath in September I had an opportunity of referring to Mr Yarrell's late work on British Fishes, where there is the following notice of this animal as an occasional visitant of our coasts "The genus of Sharks next in order, according to Cuvier's arrangement in the 'Règne Animale,' is that of *Zygæna* or Hammer-headed Sharks, of which a single specimen is recorded by Messrs C and J Paget, in their 'Sketch of the Natural History of Yarmouth,' p 17, to have been taken there in October 1829, the head of which is now preserved in the Norwich Museum " He adds in a note " the specific name of the example taken and here referred to has not I believe been determined A reference to a paper by M Valenciennes in the ninth volume of the Mémoires du Museum, which supplies detailed descriptions of four species of the genus, would probably settle this point A representation of the most common species *Zygæna malleus* Val, is here given as a vignette to draw the attention of observers to the subject ' Upon inspection of the vignette the Tenby specimen was instantly recognized*, and its identity with *Zygæna malleus* Val completely established by a subsequent reference to the ' Mémoires ' The owner of the fish would be very glad to dispose of it

Amongst the variety of animals which we had opportunities of seeing during our stay at this charming marine watering-place none afforded greater interest than a small Medusa belonging to the genus *Cyanæa* Cuv It cannot I think be referred to any known species† for it differs from all the figures of the smaller Medusæ in the Zoologia Danica the Tableau Encyclopédique and Regne Animale, and likewise from those illustrative of Dr Macartney's paper in vol c of the Philosophical Transactions ' chiefly in the depth of the bell or disc and length of the tentacula

Having been discovered by Mrs Davis who had likewise the best opportunity of watching its motions during several weeks that she kept it in a glass of sea water at Tenby and afterwards here whither it was conveyed in a phial of the same, and lived three weeks after its arrival I will state the history of this thing of light and life in her own words One morning while pouring some sea-water into the vessels containing my Actiniæ, I observed two small objects which I took for the young of these animals, and as quickly as possible raised them in a spoon out of the basin and placed them in a tumbler of clean sea-water They resembled *tiny* bell-glasses Four transverse rays were perceptible on their sides and a minute red body with four white arms forming a cross, was suspended in the water Around the edge of the bell or disc appeared a delicate white fringe which was lengthened or shortened at the pleasure of the animal The contraction was sometimes so great as to give to the fringe the appearance of being knotted up to the edge of the bell or disc It was highly interesting to watch their movements in the water as they ascended from the bottom the bell or disc contracting and dilating alternately until the animal arrived near the surface of the water This motion was particularly conspicuous at the edge of the disc, and the fringe or tentacula became shortened as the animals rose in the water, but when they descended again the tentacula lengthened, sometimes to a great degree, after which the animals sunk gradually, and without any visible effort At the end of a fortnight one of my pets turned itself inside outwards, and remained in this state for some time, when it died and left only a few flocculent particles at the bottom of the vessel The other lived more than two months longer and even bore a voyage to Bath in a closed phial of sea-water, and remained active and vigorous during the space of three weeks, when it likewise shrunk, died and disappeared like the former but without the previous eversion As a species it may perhaps be thus characterized *Cyanæa coccinea*, minute, campanulate, translucent, with four faint rays In the centre a red ball with four white arms forming a cross at the margin of the disc numerous tentacula being sometimes as long as the disc, at others shortened, as if knotted up to the margin of the disc

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* See also Suppl to British Fishes, Part II p 61

† Perhaps it may be a species of *Oceania*, allied to *O cacuminata* of Eschscholtz, and which has not before been noted as British —Ed

See Pl II fig 1 natural size, as it appeared in sea-water, fig 2 magnified, with tentacula expanded, fig 3 ditto, with tentacula contracted

During our stay at Tenby the sea was often very luminous, and whenever this happened, the sea-water brought in daily for some Actiniæ and other marine animals which I kept alive in basins exhibited the phænomenon when in motion but never while at rest Even breathing upon it when viewing the animals which it contained was sufficient to excite its luminous appearance Being anxious to ascertain the cause of the luminosity I night after night examined carefully the water, taking up sometimes what seemed to be sparks of fire in a spoon or glass, without discovering anything more than small bubbles, which instantly burst and vanished Could these be the *Medusa scintillans* of Macartney Phil Trans ' vol c ? I had no opportunity of examining them with glasses of high power The weather was hottest at the time when the sea was most luminous, and it was the opinion of persons on the spot who made use of the water, that it was salter when luminous than at other times Dr Macartney in his Observations upon Luminous Animals ' in the Phil Trans mentions *Pholas Dactylus* amongst others as exhibiting the phænomenon, but that animal never appeared luminous to me, although I kept it alive and in a vigorous state many weeks In the course of my observations I saw no reason to attribute the luminosity of the sea to any animal '

I am Sir, your most obedient servant,
J F Davis, M D, F L S

MR F M JENNINGS ON EELS KILLED BY FROST, IN A LETTER TO W THOMPSON ESQ

Cork, March 18th, 1841

Dear Sir,—I send you the following account of a phænomenon which took place in the river Lee about six miles below Cork, in some respects similar to that which occurred in the river Lagan (see p 75 of the present volume) I much regret not having heard of the circumstance until nearly a month after it had occurred and then I was not able to glean any information except from the boatmen in the vicinity, the remembrance was however fresh in the minds of all, and the testimony of those I consulted agreeing in every particular, I am confident that the following account must be true

During the 5th, 6th and 7th of February the ground being covered with snow and the weather intensely cold, the boatmen in the vicinity of Passage Monkstown and Carrigaloe captured considerable numbers of the Conger Eel (*Anguilla Conger* Linn), of all sizes, varying from a foot to five and six feet in length Many of them were left on the strand as the tide receded some dead, but the greater number alive , others were followed in boats as they swam near the surface of the water and killed with sticks whilst many committed suicide by swimming up on the strand In a similar way they were caught from Hop Island to Ringaskiddy a distance of five miles on the west side of the Lee and from Smith Barry's Bay to the limekiln opposite Monkstown (about three miles) on the east side those which were taken on Hop Island seem to have been washed up by the tide as they were dead

It appears strange that a fish like the eel usually found at the bottom of the river should be affected by the cold, when one reflects, that the depth of the river varies in some of these places from forty to sixty feet—the water here though not quite so salt as the sea, is yet very salt

One individual caught as many as thirty seven but it would be impossible to form any idea of the numbers taken, as immense quantities were picked up by the boatmen and others as they walked along the strand As such a long time elapsed before I heard of the circumstance, I had no opportunity of seeing any of them but there can be no doubt that they were the Conger Eel

Dr Scott of Cove was kind enough to give me, from his meteorological journal the temperature and the direction of the wind about and during the time of the event

Feb 1841	Max	Min		Wind at 9 A.M
3	29	27	Snowy	East
4	28	25	Snowy	East
5	30	27	Snowy	East south-east
6	31	28	Snow-gale	East
7	30	27	Snowy	East
8	38	34	No snow falls	East
9	40	33	No snow-falls	North east

Believe me Sir, yours truly,
FRANCIS M JENNINGS

William Thompson Esq Belfast

ON THE OCCURRENCE OF *ANEMONE RANUNCULOIDES*

BY THE REV W HINCKS, M A, F L S

To the Editors of the Annals and Magazine of Natural History

GENTLEMEN,—Wishing to add to my herbarium a truly wild specimen of the very rare *Anemone ranunculoides*, I lately devoted a day to an excursion with a friend to the neighbourhood where alone, I believe, in these islands, it is now reported to be found wild

Hudson gives the station " near King's Langley, Herts ," Mr Geo

Anderson, " near Abbot s Langley ' Proceeding by the Birmingham railroad to the King's Langley station, I first examined the neighbourhood of that village and made some fruitless inquiries I then proceeded to Abbot s Langley examining carefully some woods on the way At length, in passing through the village of Abbot's Langley I observed the plant growing under a tree on the lawn before a house not far from the church Having found out the gardener, I learned from him that it is reputed wild in this situation, that it has never been known to be planted and comes up yearly, sometimes in one spot, sometimes in another, in considerable abundance but he does not believe that it grows in other places in the neighbourhood He obliged me with several specimens which I presume are as wild as any found in England and I have little doubt of this being the very station referred to both by Mr Hudson and Mr Geo, Anderson though if it be true that the plant is found nowhere else in the surrounding country its being entirely within the enclosure of one gentleman s grounds must lead to a suspicion that it has at some time been introduced

Believe me to be, dear Sirs, very truly yours,
William Hincks

Torrington Square April 20, 1841

On the Irish localities for Dianthus plumarius —The *Dianthus plumarius* has no claim to a place in the Irish Flora, being evidently an outcast from gardens where it has been found, as, for example, at Blackrock which abounds in gardens, and on the cliffs of Hop Island, immediately over which there is a flower garden it was also said to have been found on an old castle near Kinsale, since pulled down I have searched all these places in vain for the plant

The only *Dianthus* found near Cork is *Dianthus deltoides* which occurs very sparingly in a dry hilly pasture near Dunscomb Wood I met with it in June 1836, and specimens from that locality are in the possession of J T Mackay, Esq —Wm T Alexander

Naval Hospital, Plymouth, March 11, 1841

[The *Dianthus plumarius* and *Caryophyllus* have as little claim to a place in the English Flora, for they are scarcely ever naturalized in the stations recorded for them —Edit]

Suicidal powers of Luidia — ' The wonderful power which the *Luidia* possesses, not merely of casting away its arms entire, but of breaking them voluntarily into little pieces with great rapidity, approximates it to the Ophiuræ This faculty renders the preservation of a perfect specimen a very difficult matter The first time I ever took one of these creatures I succeeded in getting it into the boat entire Never having seen one before, and quite unconscious of its suicidal powers, I spread it on a rowing-bench, the better to admire its form and colours On attempting to remove it for preservation, to my horror and disappointment I found only an assemblage of rejected members My conservative endeavours were all neutralized by its destructive exertions, and it is now badly represented in my cabinet by an armless disc and a discless arm. Next time I went

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ERRATA.

Page 19. *Vitrina*, last line but one, *for* this *read* which.
— 20. 16th line, *for* give *read* gain.
— 26. *Helix granulata*, *for* 1838 *read* 1834.
— 31. *Helix umbilicata*, *for* rock limestone *read* rock—limestone—.
— 199. *Helix Pisana* should be in the 4th instead of the 2nd column.
— 199. *Vertigo edentula* should be in the last column but one, instead of the last.
— 200. *Ancylus fluviatilis*, *add to* La Bergerie column.
— 201. line 3, *instead of* which is *read* which latter is.
— 202. line 19, *for* renders *read* render.
— 395. line 8 from bottom, *for* Rio Bremo *read* Rio Branco.

[illegible]tions made at the Apartments of the Roya[illegible]ety by the Assistant Secretary, Mr Roberton, by Mr Thompson at the Garde[illegible] of the [illegible]ticultural Society at Chiswick, near London, by Mr Veall at Boston and by Mr Dunbar at Applegarth Manse, Dumfries shire

Days of Month 1841 March	Barometer						Thermometer								Wind				Rain				Dew point
	London Roy Soc 9 a.m	Chiswick		Boston 8½ a.m	Dumfries shire		London Roy Soc			Chiswick		Boston 8½ a.m	Dumfries shire		London Roy Soc 9 a.m	Chiswick 1 p.m	Boston	Dumfries shire	London Roy Soc 9 a.m	Chiswick	Boston	Dumfries shire	London Roy Soc 9 a.m
		Max	Min		9 a.m	8½ p.m	Fahr 9 a.m	Self register Max	Self register Min	Max	Min		Max	Min									
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